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VOLUME 7 JUNE, 1928 NUMBER 6

THE ROENTGEN RAY AS AN AID IN THE INJECTION OF THE SPHENOPALATINE GANGLION

O. H. HOMME, M.D.
LOS ANGELES

Since attempts to inject the sphenopalatine ganglion are not always successful, it occurred to me that the roentgen ray could be used as an aid in the technic of injection. With this thought in mind, a roentgen-ray study of the pterygopalatine region was made. In this study, the following roentgenograms were made:

1. Views of the skull and adult head to show the pterygopalatine canal and the sphenopalatine foramen and their relation to adjacent structures.

2. Views of the skull with one probe in the pterygopalatine canal and another hooked in the sphenopalatine foramen through the middle meatus of the nose.

3. Views in clinical cases with needles introduced according to the methods of Dr. Ruskin and Dr. Sluder.

STUDIES OF THE SKULL

Figure 1 is a lateral view in which only half of the skull was used in order to eliminate, as much as possible, superimposing shadows. Figure 2 is a lateral view of an adult head and figure 3 is an antero-posterior view.

The sphenopalatine foramen lies posterior to the middle turbinate below the anterior portion of the sphenoid sinus, in the lateral wall of the nose. It lies in line directly medial to the zygomatic arch approximately midway between the external auditory meatus and the anterior margin of the infra-orbital ridge, and approximately halfway between the cribriform plate of the ethmoid and hard palate. The pterygopalatine canal, or, more properly, sulcus, which leads from it down to the hard palate, is not straight, nor is it constant in length and breadth. Beginning at the posterior palatine foramen, near the second or third molar tooth and about 0.5 cm. anterior to the posterior margin of the hard palate, the canal passes slightly laterally and posteriorly for the first half of its course, and then bends slightly anteriorly and medially to reach the sphenopalatine foramen. It is to be remembered that the canal is not closed laterally in the pterygopalatine fossa nor above in the region of the inferior orbital fissure. Because of this, a needle

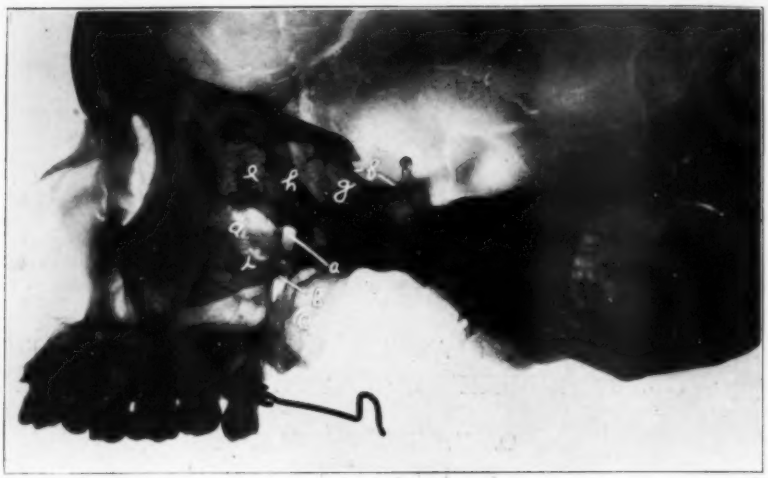

Fig. 1.—Lateral view of the skull. *a* indicates the sphenopalatine foramen; *b*, the pterygopalatine canal; *c*, the pterygoid laminae; *d*, the upper posterior angle of the antrum; *e*, the posterior ethmoid region; *f*, the sella turcica; *g*, the sphenoid sinus; *h*, the concha of the body of the sphenoid, and *i*, the zygomatic arch showing the temporozygomatic suture. The sphenopalatine foramen lies medial to the distal portion of the zygomatic process of the temporal bone.

Fig. 2.—Lateral view of the adult head. The points marked are the same as in figure 1.

passing up the canal may pass laterally into the infratemporal fossa and not reach the vicinity of the ganglion; or it may pass upward through the inferior orbital fissure into the orbital canal.

Figures 4 to 10, inclusive, are studies of the skull, with a probe in the pterygopalatine canal and one hooked in the sphenopalatine foramen through the middle meatus of the nose.

In figure 4, I used only the lateral half of the skull so as to eliminate superimposing shadows, and to point out distinctly the ptergopalatine canal and the sphenopalatine foramen with the probes in place.

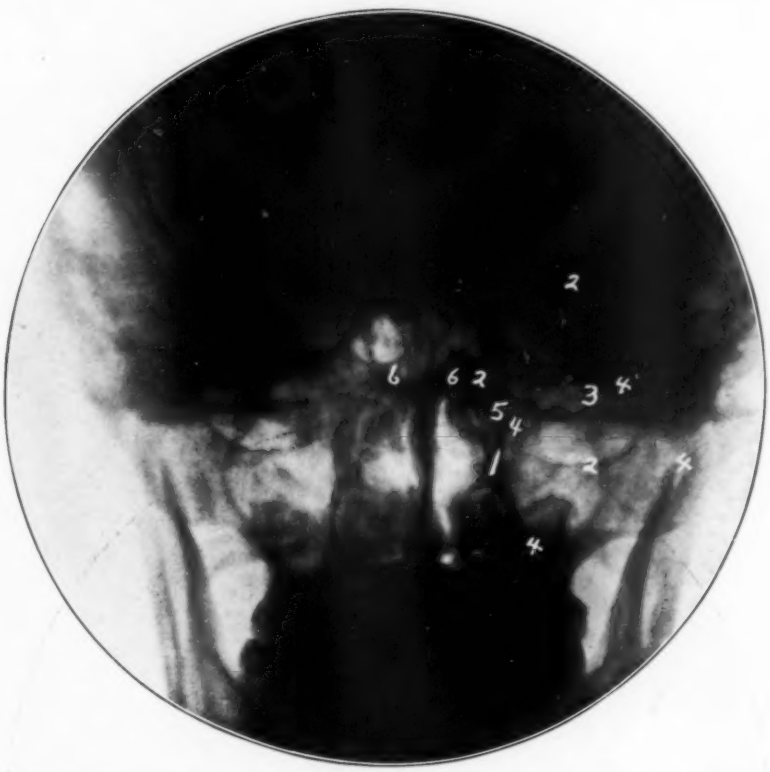

Fig. 3.—Anteroposterior view of an adult skull. *1* indicates the lateral nasal wall at the attachment of the inferior turbinate; *2*, the rim of the orbit; *3*, the floor of the orbit over the antrum; *4*, the outline of the antrum; *5*, the region of the sphenopalatine ganglion and *6*, the floor of the sphenoid sinus.

Figure 5 is the same as figure 4, except that the whole skull was used. Note how the upper part of the canal curves slightly anteriorly to reach the sphenopalatine foramen.

Figure 6 is an anteroposterior view of a skull, showing how a slightly curved needle in the pterygopalatine canal will more closely approximate the lateral wall of the nose. I have not seen the slightly curved needle used in the pterygopalatine canal, mentioned before. It

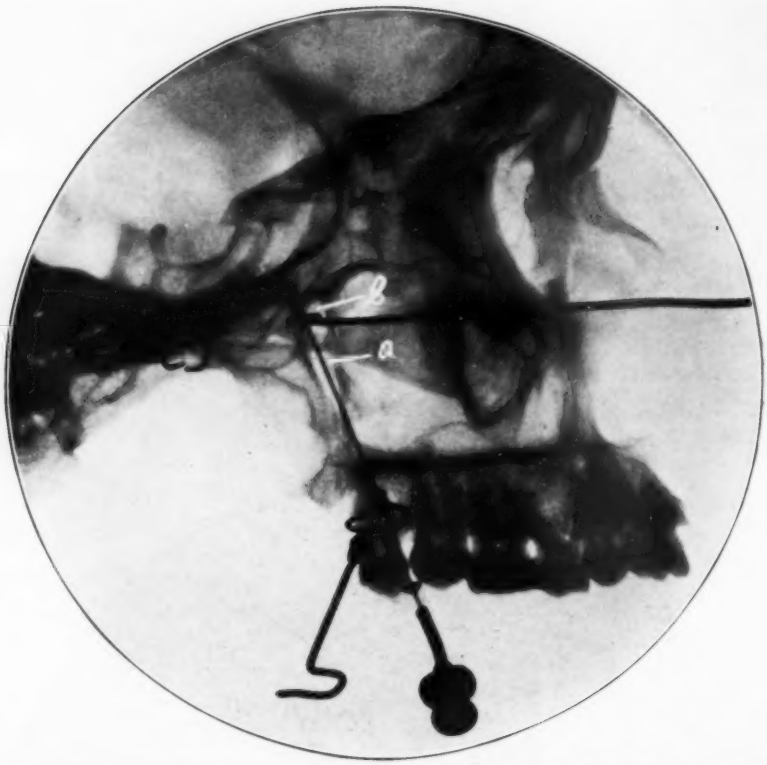

Fig. 4.—Study of the skull with a probe in the pterygopalatine canal and one hooked in the sphenopalatine foramen through the middle meatus of the nose. Figures 4 to 10 inclusive are similar studies. *a* indicates the pterygopalatine canal; *b*, the sphenopalatine foramen.

Fig. 5.—Same as figure 4. *a* indicates the pterygopalatine canal; *b*, the sphenopalatine foramen.

seems highly desirable from anatomic studies, because it is less likely to pass laterally out of the pterygopalatine canal into the infratemporal fossa. The amount of curvature of the needle is illustrated in the roentgenogram. On introduction, the concave side of the needle faces medially.

Figure 7 is an anteroposterior view of a skull in which the probe was purposely passed up the pterygopalatine canal through the inferior orbital fissure until it showed just above the floor of the orbit.

Fig. 6.—Anteroposterior view of a skull. A slightly curved needle was used. *a* indicates the probe in the pterygopalatine canal; *b*, the probe hooked in the sphenopalatine foramen through the middle meatus of the nose; *c*, the sphenoid sinus and *d*, the floor of the orbit.

Figure 8 is the same as figure 7, except that it is a lateral view. These two views show how a roentgenogram read at the time of insertion of the needle would aid greatly in the elimination of the danger of passing the needle too high in the pterygopalatine canal.

Figures 9 and 10 show a skull in which a straight probe was passed up the pterygopalatine canal, then laterally out of the canal to impinge in the infratemporal fossa.

Fig. 7.—Anteroposterior view of the skull. *a* indicates the probe in the pterygopalatine canal; *b*, the floor of the orbit.

Fig. 8.—Lateral view of the skull, *a* indicates the probe in the pterygopalatine canal; *c*, the concha of the body of the sphenoid.

This group of roentgenograms illustrates how definitely one can see whether or not the needle in the posterior palatine foramen has gone too far laterally.

Figures 11 to 15, inclusive, are roentgenograms in clinical cases.

Figure 11 shows definitely that the needle in the pterygopalatine canal has passed laterally into the infratemporal fossa.

Figures 12 and 13 were made in clinical cases and show definitely that a curved needle hugs the lateral nasal wall. They also show the relation of the ostium of the sphenoid to the sphenopalatine foramen.

Fig. 9.—Skull in which a straight probe was passed up the pterygopalatine canal, then laterally out the canal to impinge in the infratemporal fossa. *a* indicates the needle in the posterior palatine foramen; *b*, the needle in the middle meatus of the nose; *c*, the region of the pterygopalatine canal.

Figures 14 and 15 were made in a clinical case, and show a needle passed through the soft palate up along the retropharynx. The needle in the middle meatus is in good position and may be inserted about 1 cm. farther to reach the sphenopalatine ganglion. This case illustrates that better localization is secured by the use of two needles and that the needle in the better position can be used.

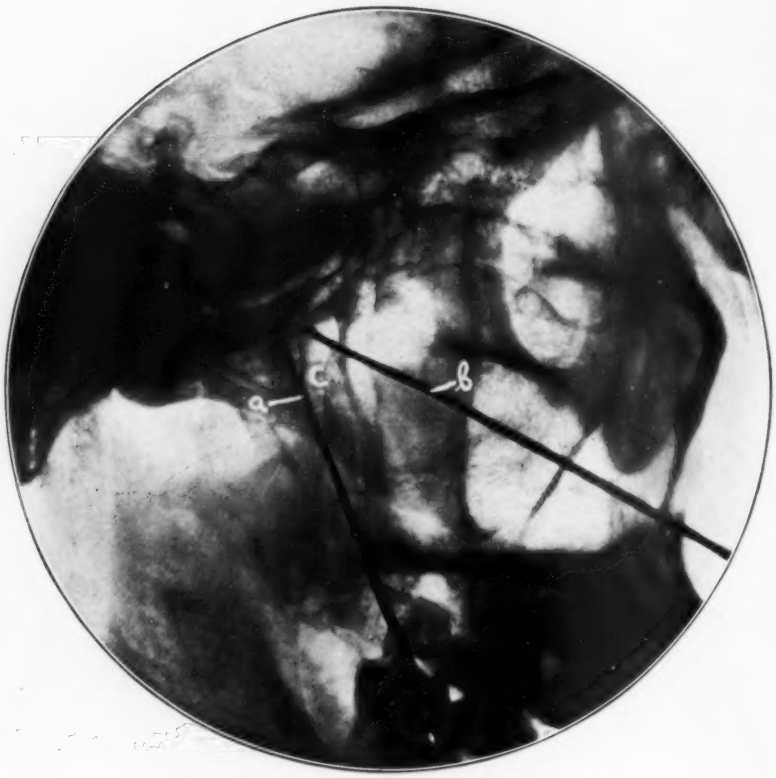

Fig. 10.—Same as figure 9; lateral view.

Fig. 11.—Skull showing that the needle has passed laterally into the infratemporal fossa; *a* indicates the needle in the posterior palatine foramen; *b*, the needle in the middle meatus of the nose; *c*, the pterygopalatine canal.

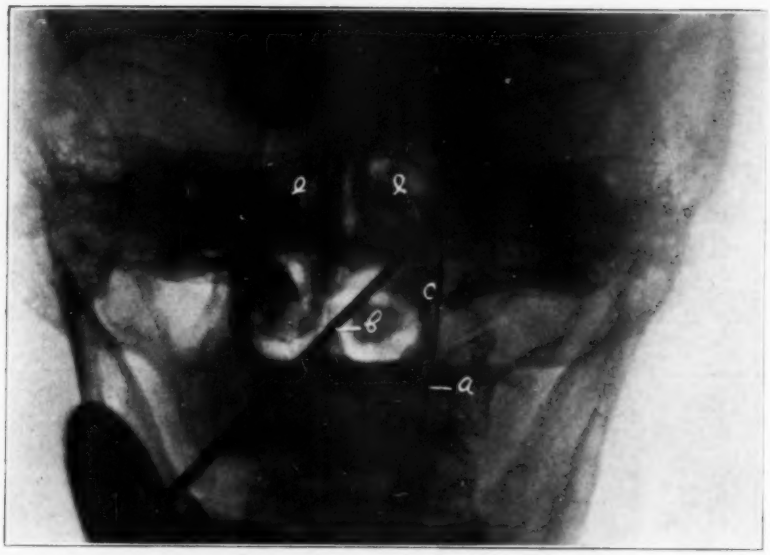

Fig. 12.—Front view of skull showing position of a curved needle; *a* indicates the needle in the pterygopalatine canal; *b*, the needle in the middle meatus of the nose; *c*, the pterygopalatine canal; *d*, the sphenopalatine foramen; *e*, the sphenoid sinus; *g*, the sella turcica; *h*, a probe through the ostium of the sphenoid in the sphenoid sinus.

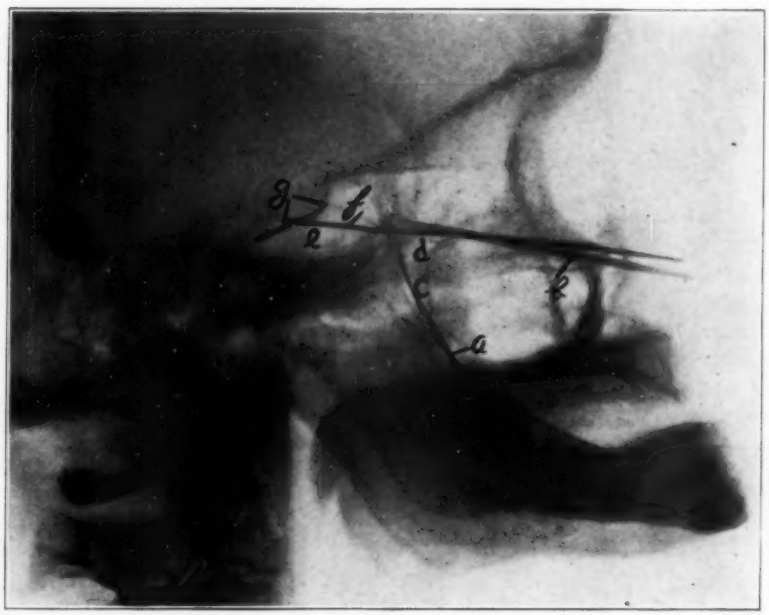

Fig. 13.—Same as figure 12; lateral view.

COMMENT

In this series of cases, I have introduced the needle through the posterior palatine foramen, according to the method of Dr. Simon L. Ruskin.[1] Dr. Ruskin, as far as I know, has used a straight needle in the posterior palatine canal. In some of these cases, I have used the straight needle in the canal and in others the slightly curved needle. In the course of my studies, it became apparent that if the needle were slightly curved along its whole extent, it would more nearly approxi-

Fig. 14.—Front view of skull showing position of a needle passed through the soft palate up along the retropharynx; *a* indicates a needle passed posterior to the hard palate into the retropharynx, posterior to the sphenopalatine foramen; *b*, the needle in the middle meatus of the nose; *c*, the pterygopalatine canal; *d*, the sphenopalatine foramen; *e*, the sphenoid sinus.

mate the sphenopalatine ganglion as it would more closely follow the pterygopalatine canal and the lateral wall of the nose.

A straight needle was introduced in the nose under the posterior end of the middle turbinate, according to the technic of Dr. Greenfield Sluder,[2] although in the *Annals of Otology, Rhinology, and Laryn-*

1. Ruskin, S. L.: Laryngoscope **35**:87 (Feb.) 1925.

2. Sluder: Nasal Neurology, Headache and Eye Disorders, St. Louis, C. V. Mosby Company, 1927, p. 123.

gology, he stated that the approach of the ganglion through the sphenopalatine foramen is less difficult and more trustworthy.[3]

It is not my purpose to advise the use of both Dr. Sluder's and Dr. Ruskin's methods at the same time on the same patient. However, by using both methods at the same time and reading roentgenograms of anteroposterior and lateral views, one could inject whichever needle

Fig. 15.—Same as figure 14; lateral view.

is apparently nearer the sphenopalatine ganglion. Better localization can be obtained when needles are in place in the nose and in the pterygopalatine canal. When it is not feasible to insert both needles, because of obstruction in the nose or because of not wishing to prolong the operation in the way of discomfort, a roentgenogram taken with the method used would be a distinct aid in the operation.

3. Sluder: Ann. Otol. Rhin. & Laryng. **86**:648 (Sept.) 1927.

CONCLUSIONS

1. In lateral views of the head, the pterygopalatine canal and the sphenopalatine foramen can be distinguished.

2. The region of the sphenopalatine ganglion is more definitely determined by the aid of anteroposterior and lateral roentgenograms taken with a needle through the posterior end of the middle turbinate and with one in the pterygopalatine canal.

3. The region of the ganglion is more nearly approached by using a slightly curved needle in place of a straight needle in the pterygopalatine canal.

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CHRONIC DISEASE OF THE MAXILLARY SINUS

DIAGNOSIS AND SURGICAL TREATMENT *

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Diseases of the nasal accessory sinuses, it would seem, are becoming more frequent, and the maxillary sinus is most frequently invaded because of its size and anatomic characteristics of development. There is no doubt that mechanical deviation from the normal in development has some influence on the ultimate welfare of the maxillary sinus, and I am of the opinion that these mechanical changes, beginning early in life, offer hindrances and present a favorable background when invasion of the maxillary sinus occurs.

This, combined with an excessive or improper blowing of the nose while an acute rhinitis or an infection of the upper respiratory tract is present, justifies the assumption that there is a mechanical influence in the etiology of a disease of the maxillary sinus. Also, it is logical to assume that in those cases in which a spontaneous recovery of an acute infection of the sinus takes place, the mechanical features present are favorable, and sufficient ventilation and drainage of the cavity is allowed.

I have never observed that a disease of the maxillary sinus which originated in the sinus itself was a primary involvement; and from these observations, there is reason to believe that the invasion of the sinus is always secondary to some acute infection of the upper respiratory tract or inflammation which furnishes the primary stimuli. Involvement, it would seem, is generally by extension, encouraged by mechanical or developmental imperfections.

In this study, two general clinical classifications in the etiology of a chronic disease of the maxillary sinus were established. In the first classification were included those patients who give a definite history of nasal pathologic changes following an acute attack of influenza or rhinitis; these patients form the larger group. In the second classification were included those patients who were unaware of a pathologic condition, other than a slight amount of postnasal secretion, and who were referred for examination for a possible focal infection. In the larger group, the greater number of the suppurative types of disease of the sinus is found. Bacteriologic examination in these cases generally revealed a mixed type of infection, the most prevalent organism being the staphylococcus.

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* Read at the Annual Meeting of the American Laryngological, Rhinological and Otological Society, Atlantic City, May 25, 1927.

A carefully taken history covering a period of years has been of inestimable value. Pain, headache and frequent attacks of coryza, which lasts several weeks, with constant postnasal discharge, are sometimes present. After the acute exacerbation has subsided, the postnasal discharge is usually greater in the morning. There may be postnasal secretion when

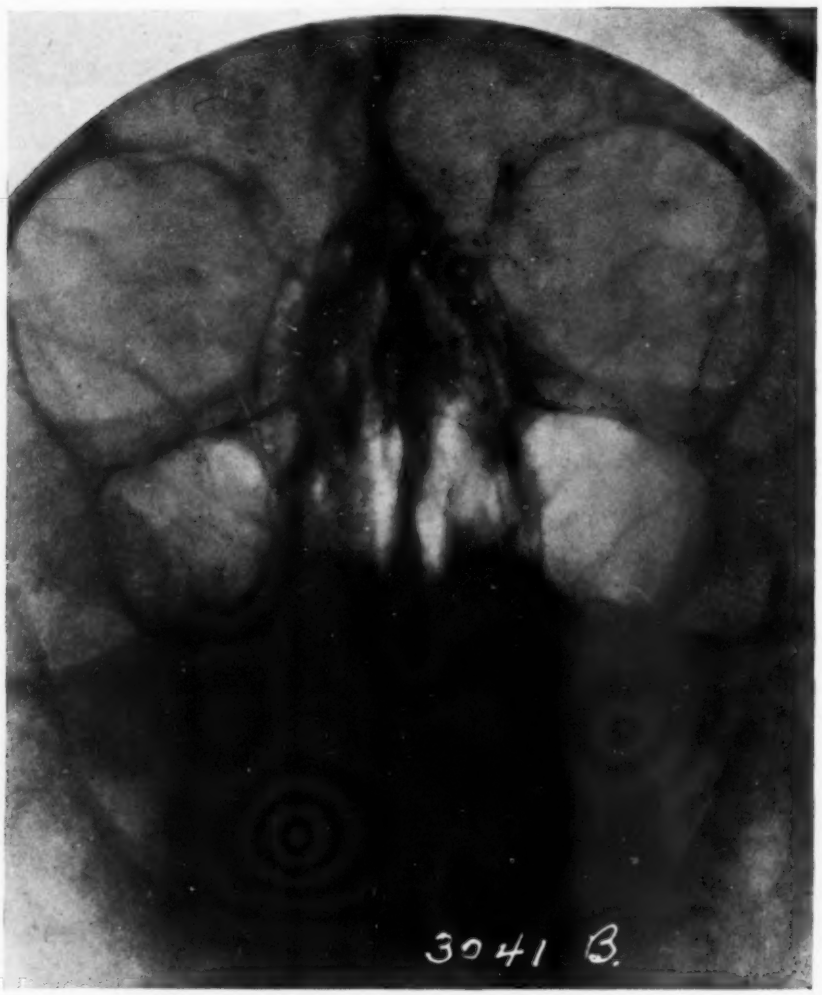

Fig. 1.—Chronic maxillary sinusitis on the left side. On the outer margin of the sinus wall is seen a well outlined polyp.

the recumbent position is assumed or when drinking or eating hot fluids or foods.

In the suppurative type of chronic disease of the maxillary sinus, pus or mucopus can frequently be seen in the region of the middle meatus or

beneath the inferior turbinate; and it is this type of disease of the sinus that is often the focus of infection in laryngeal or tracheobronchial involvement. When firm pressure of the finger or thumb is applied over the maxillary sinus, pain or tenderness is felt similar to that felt on pressure over the mastoid.

Fig. 2.—Bilateral chronic maxillary sinusitis with more complete obliteration on the left side.

Diseases of the maxillary sinus may be divided into two general classifications identical with the characteristics of the classic inflammation of all mucous membranes, namely: (1) exudative and (2) productive. There are two kinds of productive disease: (*a*) hypertrophic and (*b*) hyperplastic.

The three general groups, based on the anatomic changes are:

(1) Exudative inflammation, or the form in which the fluid and cellular exudation from the blood vessels is the predominating element.

(2) Parenchymatous or degenerative inflammation, or the form in which destruction of the parenchyma cells is the leading feature.

(3) Productive inflammation, in which proliferation is the striking characteristic.

The nature of the case, as well as the resistance of the organism or the affected part, determines the character of the inflammation.

Depending for its classification on the stage of inflammatory reaction present and bacteriologic invasion, the exudative group, the larger of the two, has many subdivisions, namely:

(1) Edematous or serous inflammation, characterized by a copious exudation of fluid from the blood vessels.

(2) Fibrinous inflammation.

(3) Pseudomembranous or adiphtheritic inflammation.

(4) Suppurative inflammation characterized by an unusual abundance of emigrated leukocytes and by a tendency to liquefaction.

(5) Hemorrhagic inflammation.

(6) Catarrhal or mucous inflammation. The term is used to designate inflammations of the mucous membranes. The character of the inflammation depends to a large extent on the individuality of the mucous membrane affected, differing greatly in the nose, throat, stomach, etc. The epithelial cells of the surface suffer degeneration (mucous or fatty) and necrosis, and are discharged, etc. In the nose, the discharge is frequently mucopurulent.

When catarrhal inflammations are chronic, there is usually considerable productive inflammation, with consequent thickening of the mucus. The greater this production of fibrous thickening, the less chance there is for a return to normal, or involution.

This study of chronic disease of the maxillary sinus has led to the opinion that involution seldom takes place when changes have occurred in the mucosal lining of the cavity. In the chronic suppurative type of involvement, the term "spontaneous healing," or healing after puncture and irrigation, designates merely a quiescent period after drainage and ventilation; the suppurative process will be activated again at irregular intervals by the proper stimulation.

This investigation has revealed the fact that the classification into types of disease of the sinus, namely, suppurative and catarrhal, is histopathologically incomplete, and that instead of being two types of inflammation, these conditions are different stages of the same type of inflammation of the mucous membrane. Exudative inflammation may occur with a discharge of mucus or pus, or of both, and to the former the term "catarrhal" is applied. This expression was adopted by laymen to describe everything from a deviation of the septum to ozena.

An exudative inflammation with a discharge of mucus may exist for an indefinite period, and it is during this stage of change in the mucous membrane that cysts and polyps occur. The swelling and edema of the mucous membrane and the dilatation and enlargement of the mucous glands are responsible for the greater number of the polypoid masses.

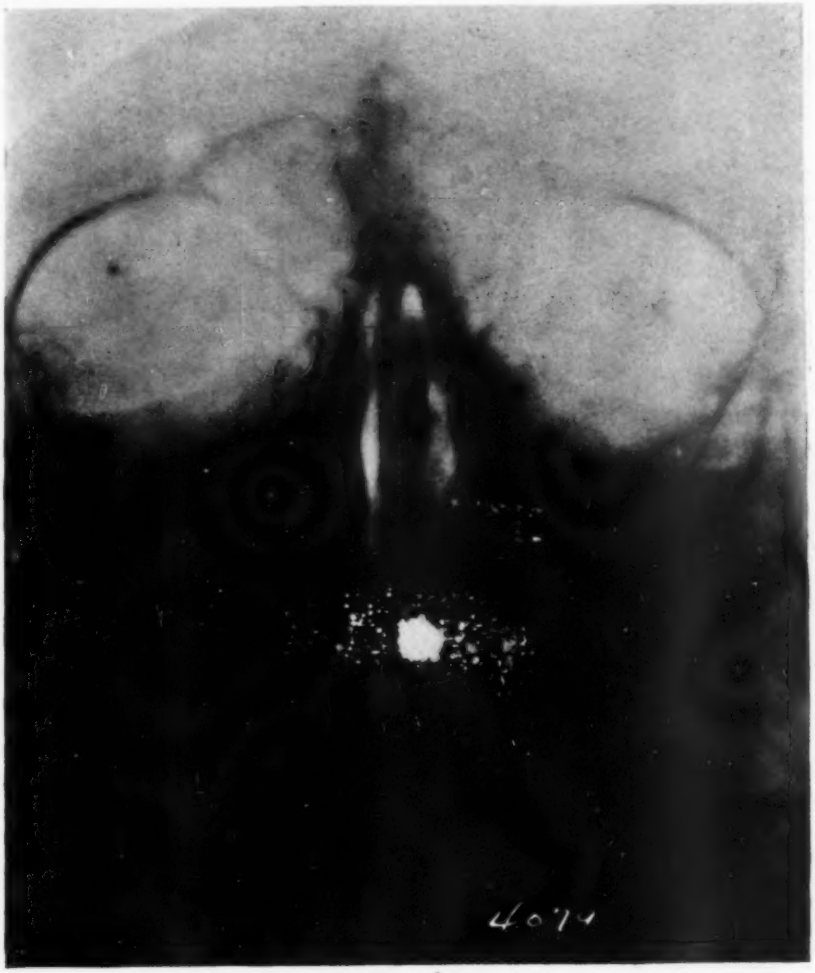

Fig. 3.—Extensive bilateral chronic maxillary sinusitis showing complete obliteration of both maxillary sinuses.

I agree with the observations of Hirsch that most of the polyps usually seen in the region of the middle meatus originate in the maxillary sinus.

The elevation of the mucosal lining in the sinus with the cordlike formations, mentioned but not explained by Zucherkandl, is caused by the

edematous infiltration and fibrous proliferation that have taken place in this type of exudative inflammation of the mucous membrane.

Polyps often occur in the region of the middle meatus because they are crowded out of place in the sinus cavity; their only outlet is the normally located ostium or an accessory opening.

Fig. 4.—Chronic maxillary sinusitis on the left side.

In this type of sinus disease the patient scarcely ever complains of discharge; when he does complain it is only of irregular expectoration of small quantities of well formed mucus firmly held together. This postnasal dropping occurs more frequently when the patient is in the recumbent position or during the ingestion of warm fluids.

This investigation has strengthened my previous view of the misleading information to be obtained by puncture or irrigation of the antrums, for washing or suction often gives one deceptive knowledge concerning a sinus with swollen, edematous polypoid masses occupying the greater part of the sinus. When the antral trocar penetrates the cavity into an edematous mass of mucous membrane, little information is to be expected from the return washing or by use of suction.

Judging from the number of children suffering with diseases of the sinus it is not unreasonable to believe that many chronic infections of the maxillary sinus started when the patient was very young, and have existed over a long period.

The clinical history and the microscopic pathologic changes that take place in these chronic infections of the sinus make it extremely difficult to determine at what period of invasion chronicity developed. It is only with a clear understanding of the pathologic processes, the changes and destruction that have taken place, that one is able to advise the patient correctly. On the understanding of these facts depends the treatment, and on the treatment the results. The most enlightening information to be obtained as to the chronicity of a disease of the maxillary sinus and as to the outlook for recovery is not in the fact that antral washing contains little or no pus at the time, but in the appearance of the alterations and destruction of the mucus under the microscope.

In several instances, in spite of the degeneration of the mucosal contents of the sinus found at operation, rhinoscopic examinations did not reveal any polypoid masses or degeneration in the nose; frequently, pus was not observed, either anteriorly or posteriorly, during these examinations.

Several of the patients presented the symptoms of headache, rheumatism, disturbance of vision, asthma, chronic bronchitis, bronchiectasis and recurrent attacks of irritation of the upper respiratory tract. The diagnosis of pulmonary tuberculosis was made in one case and tuberculous kidney in another in order to explain the headache and the symptoms of which the patient complained. In two instances, mental depression was noted. Frequently, all symptoms referable to the maxillary sinus were absent.

Observations made by transillumination of the maxillary sinus are inaccurate, and in making a diagnosis no reliance can be placed on exploratory puncture of the sinus when the results are negative.

The relationship of an infection of the teeth to the disease of maxillary sinus is largely dependent on the character and development of the sinus, and on the bone beneath the floor of the sinus. There is a greater likelihood of infections from the teeth in the larger type of sinus when a tooth projects into, or is adjacent to, the floor of the sinus. This occur-

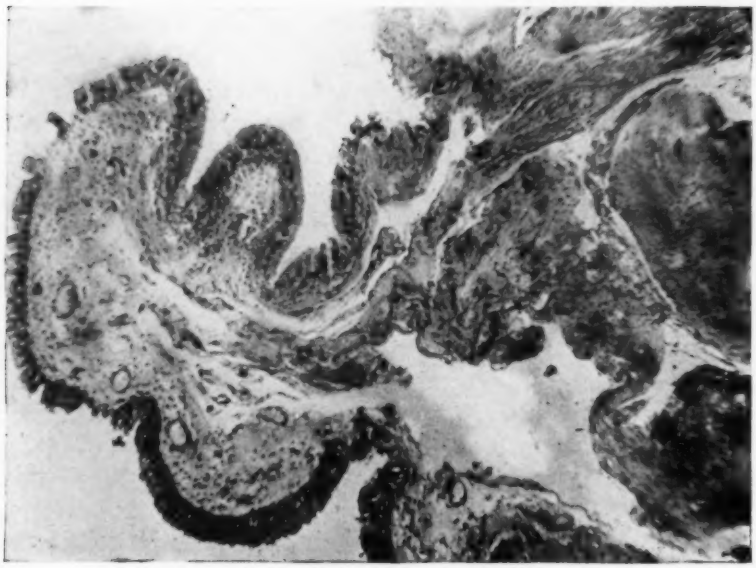

Fig. 5.—Large polypoid mass of a loosely arranged, fibrous tissue and a great amount of edema; low power magnification. Epithelium is lacking in places.

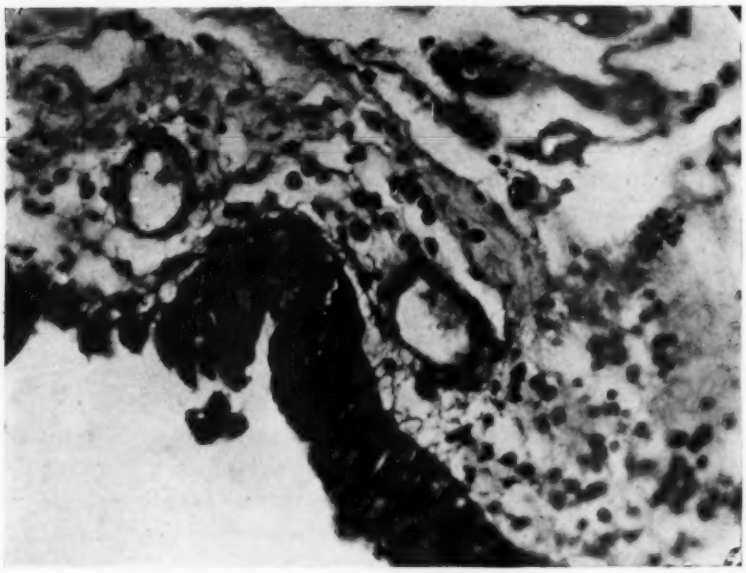

Fig. 6.—High power magnification of figure 5. Note the edematous stroma, the many plasma cells and the desquamation of epithelium in places.

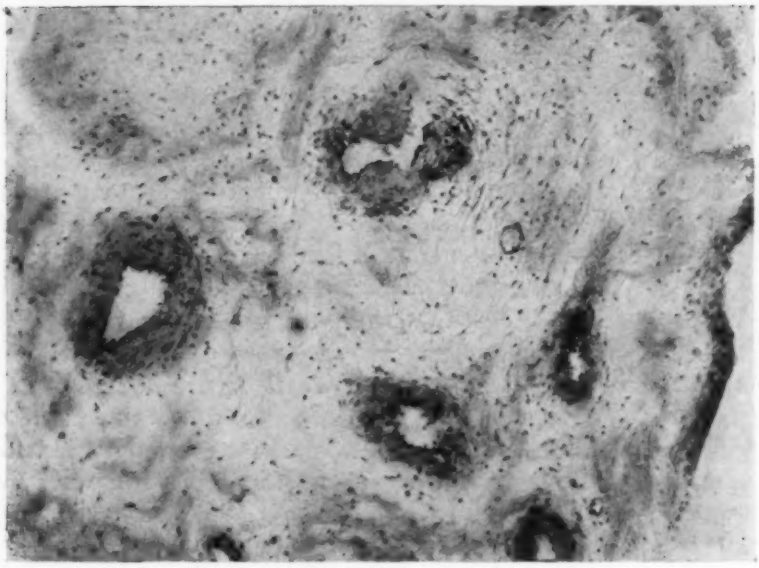

Fig. 7.—Portion through a polypoid mass showing a very edematous structure; low power magnification. Note the thickening about the blood vessels indicating a chronic process.

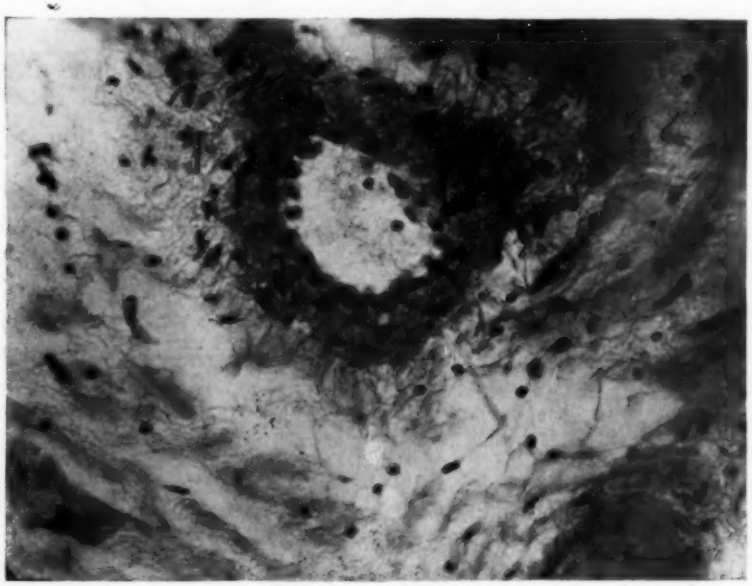

Fig. 8.—High power magnification of figure 7. Note the extensive edema, the perivascular thickening and a few plasma cells.

rence is not nearly so frequent in this series as it has been in series previously published.

The knowledge of what comprises satisfactory roentgenograms of the sinuses, of the technic of their production and of their proper interpretation has proved invaluable in obtaining the necessary information. The facts thus obtained have been confirmed by the condition revealed at operation. Contrary to the opinion of some that roentgen-ray examination is not a reliable means of diagnosis of sinus involvement, its accuracy leaves little cause for reproach when the roentgenograms are properly made and when they are skilfully interpreted. I think that criticisms of the use of the roentgen ray in this work are not due to the faults of the roentgen ray, but to the technic employed and to faulty interpretation.

In this study the operative observations were reviewed with the roentgen-ray observations made before operation and with the history and the results of rhinoscopic examination. In a few instances, tissue hyperplasia or hypertrophic changes were found in the mucous membrane that would mask the preoperative diagnosis. Hyperplastic and hypertrophic changes in the tissue can be misleading, although after one has viewed a number of properly made roentgenograms, this type of disease of the sinus presents a distinct picture which is generally promptly recognizable.

In all of the cases studied in this series, operations were performed. During the operation, discoloration and frequent thinning of the bone over the maxillary sinus were noted after the sinus had been exposed by an alveolar incision. It was decided that this discoloration of the bony wall covering the sinus was due to the thinning of the bone and added transparency which allowed the contents of the infected cavity to show through the thin, bony wall, giving it the appearance of a change in color. This change in color was more or less influenced by the contents of the cavity; it varied from a dirty gray to a bluish or reddish brown, depending on whether the sinus contained pus or polypoid masses.

The bony covering of the sinus and its contents were carefully removed and studied, first macroscopically and then microscopically, in order to note the changes that had taken place as a result of the disease. In some of the cases much resorption of bone and much thinning was found. The mucous membrane of the sinus had undergone cystic, polypoid degeneration, sometimes discolored with blood cells, which I can explain only by the possibility of a previous trauma during puncture, irrigation, or manipulation around the ostia or beneath the turbinates. In many of these cases the maxillary sinus was almost completely filled with definitely outlined, large polypoid masses attached to the superior, lateral and inferior walls of the sinus and formed a triangular occlusion with a central space. In some of the cases, a small

quantity of heavy, greenish pus was found between these polypoid masses. In many there were only polypoid masses. In cases in which Hirsch made this observation, he classified the condition as a dry catarrh.

This observation explains clearly the lack of reliability of the results of intranasal puncture or irrigation for the purpose of diagnosis, for in cases such as these, irrigation shows only negative symptoms. For the

Fig. 9.—Low power magnification very similar to figure 5, showing an edematous polyp covered by epithelium.

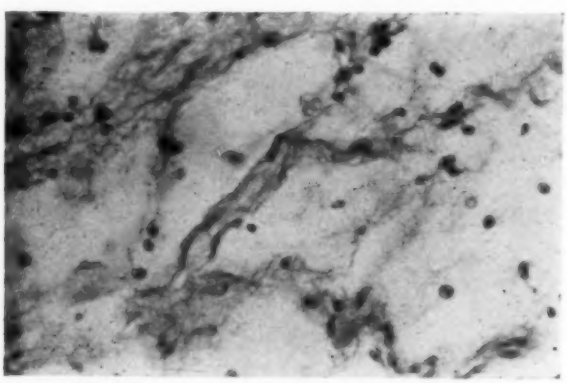

Fig. 10.—High power magnification showing details of figure 9. Note again, as in figure 6, the very edematous structure and the plasma cells.

foregoing reasons, the negative results of irrigation through an intranasal opening from a sinus containing only large polypoid masses can be readily understood.

In sections of several cases studied, I was struck by the presence of masses of eosinophilic cells in the surface of the epithelium lining the sinus. This observation will form the basis for a study to be reported later.

In one case in which I knew there had been a definitely positive Wassermann reaction two or three years previously, and in which the patient had received antisyphilitic treatment, it was interesting to observe the number of plasma cells in the epithelium lining the sinus. This is an interesting observation in the presence of syphilis, and fits in well with the microscopic pictures in cases of this type.

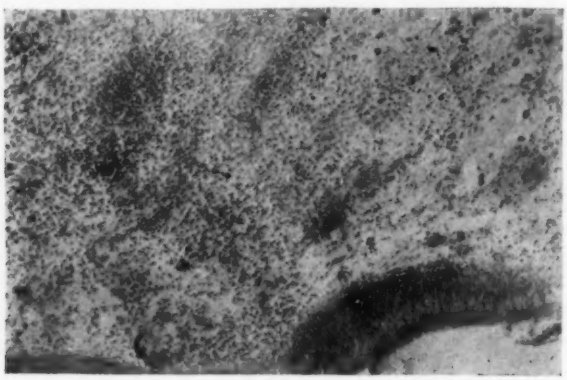

Fig. 11.—Section through a thickened portion of the mucous membrane; low power magnification. There is an infiltration of inflammatory cells, chiefly polymorphonuclears. The structure is less edematous than in some of the foregoing sections.

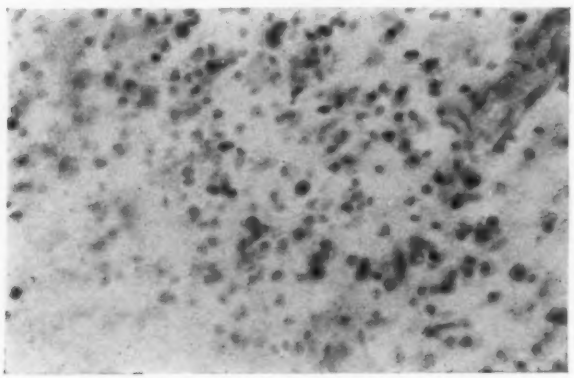

Fig. 12.—High power magnification of figure 11 showing cellular details of the specimen. There are many polymorphonuclear plasma and round cells.

The foregoing observations give one an appreciation of the importance of at least a working knowledge of the pathologic processes in disease of the sinus in order to be able to institute the proper treatment.

I believe that when a patient has been under treatment for an acute disease of the sinus for three months without recovering, one is justified in changing the treatment and the prognosis.

I shall not discuss the treatment in an acute sinus disease, but I wish to say that after an acute infection of the maxillary sinus has lasted over a period of three months when the usual methods of treatment have been employed, including puncture and irrigation or vaccine therapy, in the majority of cases the infection has ceased to be acute, and sufficient

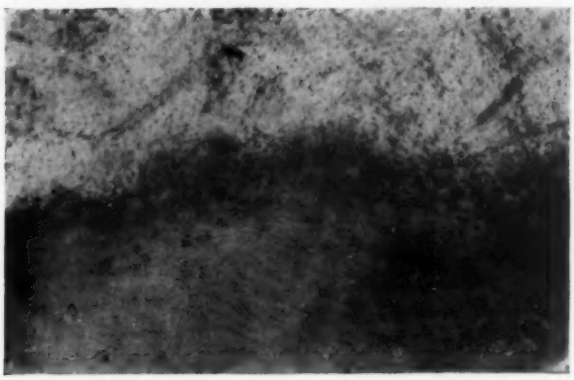

Fig. 13.—Bony wall of the maxillary sinus is shown to the right; to the left, a purulent exudate; which has caused a considerable amount of bone destruction and invasion.

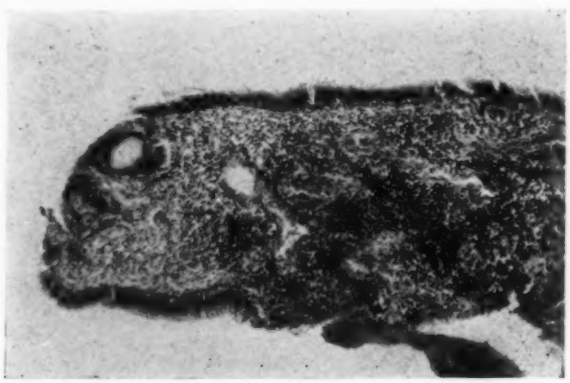

Fig. 14.—Section of hypertrophied sinus mucous membrane, showing an extensive invasion by polymorphonuclear cells; low power magnification. Note the absence of mucous membrane over some sections of the specimen.

changes have taken place in the mucous membrane to justify radical methods to bring about recovery.

With the diagnosis of chronic disease of the maxillary sinus definitely established, it has been my experience that no surgical measure is more satisfactory than the radical operation on the maxillary sinus. Local

anesthesia is much to be preferred and offers many advantages in operations of this kind.

The three most popular radical operations at the present time are: Caldwell-Luc, the Denker and the Ballenger-Canfield.

The Caldwell-Luc operation is satisfactory, but I do not believe that it allows as complete an exposure, with as complete postoperative drain-

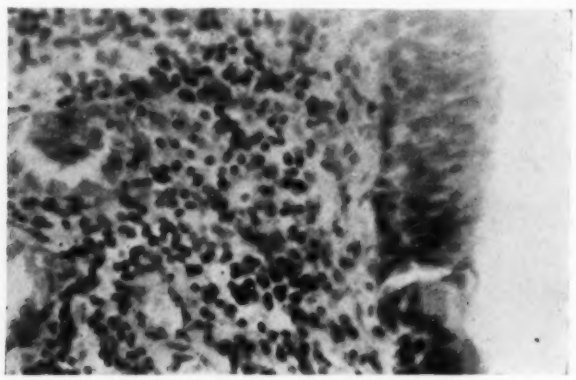

Fig. 15.—High power magnification of figure 14. Note the extensive infiltration by polymorphonuclear round and plasma cells.

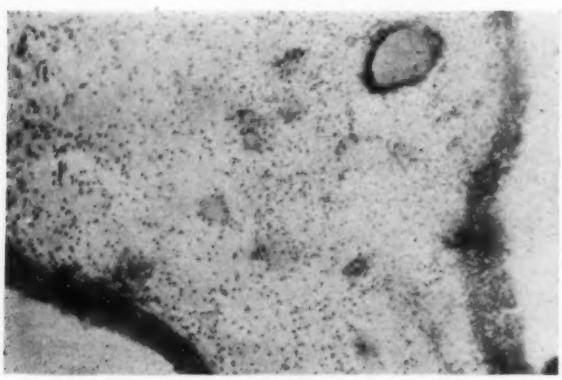

Fig. 16.—Section through a polyp showing a moderately edematous structure and some inflammatory infiltration.

age and exposure, and comfort to the patient as does the Denker operation. The methods of operation are practically the same, with the exception that in the Denker operation the bridge of the bone between the apertura pyriformis is removed in addition to the facial wall of the maxillary sinus, which affords ample drainage and ventilation and throws the inferior meatus and the maxillary sinus into one cavity. This

is the one step of the operation that, in my opinion, makes it superior to the Caldwell-Luc. The Denker operation is more satisfactory for the foregoing reasons, and affords a greater view of the sinus; the post-operative care is far more comfortable for the patient. The results are ideal if the pathlogic processes have been completely removed.

The Ballenger-Canfield or Ballenger-Sturmann operation is an attempt to perform a radical operation through an incision within the vestibule of the nose. This operation is satisfactory when the maxillary sinuses are extremely small or shallow, but in the presence of a large sinus, it does not afford direct inspection as completely as does the Denker or Caldwell-Luc operation. The only point in favor of this operation is that an incision over the alveolar margin is avoided. Were it possible to inspect the entire sinus cavity this method would be the most desirable.

CONCLUSIONS

1. In an infection of the maxillary sinus that has continued over a period of three months, sufficient changes have taken place to justify change in treatment and in prognosis.

2. A radical operation must be performed in order to remove completely all pathologic processes from a diseased maxillary sinus.

3. The roentgen ray offers valuable aid in the diagnosis of chronic disease of the maxillary sinus.

4. Exploratory puncture and irrigation for diagnosis is frequently misleading.

5. Local anesthesia is much to be preferred in operations of this character.

6. The Denker operation offers the most certain and reliable means of permanent relief, and should be the operation of choice.

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PROGRESSIVE FACIAL HEMIATROPHY

III. REPORT OF A CASE, WITH OTHER SIGNS OF DISEASE OF THE CENTRAL NERVOUS SYSTEM *

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In this, the third case report of progressive facial hemiatrophy, the syndrome which on first inspection seemed to be limited to the face was again found to be diffuse.

It has been pointed out [1] that progressive facial hemiatrophy may be associated with convulsions, scleroderma and many forms of autonomic imbalance, such as anisocoria, disturbances in growth, visceral sensation, emotions (lability and depression) and fat metabolism. The best explanation for the apparently unrelated and fortuitous collection of signs is that the facial changes, as well as the other alterations in the tissues and in metabolism, result from lesions in the vegetative apparatus of the diencephalon or brain stem.

REPORT OF CASE

The following case is additional evidence for this hypothesis:

History.—A housewife, aged 30, entered the outpatient department of the Boston City Hospital in June, 1927, complaining of generalized aches and pains, especially in the right arm and leg, "nervousness" and a progressive loss of substance of the right side of her face.

Her family history was unimportant. She had had several pregnancies. Her childhood had been uneventful, except for a few infantile convulsions and the measles. A facial asymmetry was first noted at the age of 10. The right eye appeared to be sinking into the head, and the lids were closer together. She attributed this change to a chronic conjunctivitis which she had had at intervals since her earliest childhood. The emaciation of the right side of the face continued slowly, and the progression was apparent only when photographs taken at various ages were compared.

Four years before admission, she began to suffer with generalized "achiness" or soreness that occurred first in the calves, ankles and toes and later in the hands and arms; it was worse on the right. The pain was in the soft parts, in the skin or just below it, and was never in the bones or joints. The weight of the bedclothes became unbearable, and the weight of a pen or pencil on the hand when writing was troublesome; even slight pressure against the skin from garments caused discomfort.

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* From the Neurological Service of the Boston City Hospital.

1. Wolff, H. G., and Ehrenclough, A.: Trophic Disorders of Central Origin, J. A. M. A. **88**:991 (March 26) 1927. Wolff, H. G.: Progressive Facial Hemiatrophy. II. Report of a Case with Convulsions and Anisocoria, J. Nerv. & Ment. Dis., to be published.

The patient complained also of a right-sided headache much of the time, which varied from a usual dull ache to a prostrating, distressing throb during menstruation. She had palpitation, flushing, cold hands and feet and dyspnea without exertion. Chronic gastro-intestinal distress, belching, a feeling of heaviness in the epigastrium and distention were present. She menstruated every three weeks, and the flow lasted for six days. During this period, all her symptoms were aggravated.

Physical Examination.—The patient was short and stockily built, without obvious gross organic defect. The right eye was deeply sunken, and the usual pad of soft skin and fat about it was absent. The orbit was like that of a dehydrated, emaciated, elderly person, except that the skin was hard, firm and

Appearance of patient with progressive facial hemiatrophy especially about the right eye, nose and cheek.

without redundant folds. The lids were close together, but actual paresis of the muscles was not present. Only on extreme effort could the eye be widely opened. There was a slight rigidity and tightness of the skin about the nose and cheek, extending as far as the angle of the jaw. In texture it resembled the skin on the back of the hand of patients with paralysis agitans. It was smooth, shiny, inelastic or stiff, leathery and tight. The hair on the right side of the head was less abundant and slightly gray. Gray hairs were not present on the left. The right side of the tongue was smaller than the left. With the exception of a slight inflammation, the conjunctivae were normal.

When the flesh of the arms or legs was lifted in the fingers or gently squeezed, she complained bitterly. At the time of the present examination, the right arm was still more tender, although the leg had improved and was about

as sensitive as the left side. The patient wept easily and was excessively fatigable. The pupils, eyegrounds, reflexes, sensory examination and motor function were all normal.

COMMENT

The patient presented a syndrome similar to that in the first of this series. The association of progressive facial hemiatrophy with generalized paresthesia and tenderness of the soft parts and many signs of autonomic imbalance and depression indicated that the condition was a trophic disorder of central origin of which the facial changes were only a part.

NEW MODIFICATION OF RADICAL OPERATION ON THE MASTOID

PRELIMINARY COMMUNICATION *

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AND
WILLIAM M. JOYCE, M.D.
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The usual radical operation on the mastoid requires a long period of dressing which is painful to the patient and troublesome to the surgeon. If a skin graft is not performed, a cavity lined with scar or granulation tissue remains. If the cavity becomes dry, it has to be watched and freed from scales at more or less frequent intervals. If the cavity remains wet or moist, the granulation tissue has to be worked with constantly to keep it from filling the mastoid cavity. If a skin graft is performed, it generally necessitates another anesthesia and a breaking open of the partially healed wound. The results of the usual thin skin graft are often unsatisfactory. Frequently the graft is successful over only a small area or not at all.

Nature has lined the auditory canal with skin, and the best operation on the mastoid leaves the auditory canal lined with solid, thick, complete skin. Naturally skin does not grow directly on bone. The periosteum lies between. Therefore, the proper skin graft for a cavity or new auditory canal caused by a radical operation on the mastoid is complete skin with the periosteum. Such skin will become attached readily, as it is a union between periosteum and bone, which naturally grow together.

A piece of skin that is detached with the periosteum from a distant part of the body and placed in the cavity would die because of the lack of nutrition. A pedicaled flap is made back of the incision which is turned into the mastoid cavity.

Dr. Pierce [1] seems to have been the only surgeon to do anything like this. For the purpose of closing the eustachean tube, he used a small strip of skin attached at the upper end of the incision made when the mastoid was operated on. The tip of the flap was drawn down into the opening of the eustachean tube and held there by a special mechanism as Dr. Pierce's purpose was to close the eustachean tube. A search of the literature did not reveal that any one else had ever used a pedicle flap graft in the ear.

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* From Northwestern University Medical School.

1. Pierce, N. H.: New Method of Closing Eustachian Tube in Radical Mastoid Operation, J. A. M. A. **79**:1101 (Sept. 10) 1922.

OPERATIVE TECHNIC

Our pedicaled skin graft is prepared in the following manner. The original incision (*AB* in fig. 1) is made through the skin only, remaining a quarter of an inch back of the auricle, from a point directly above the auditory meatus to the tip of the mastoid. The skin is loosened forward a quarter of an inch, and an incision is made through the periosteum in a line parallel with the first incision. The periosteum is elevated, and the bone work of the operation is performed in the usual manner. When this work is done, a second incision

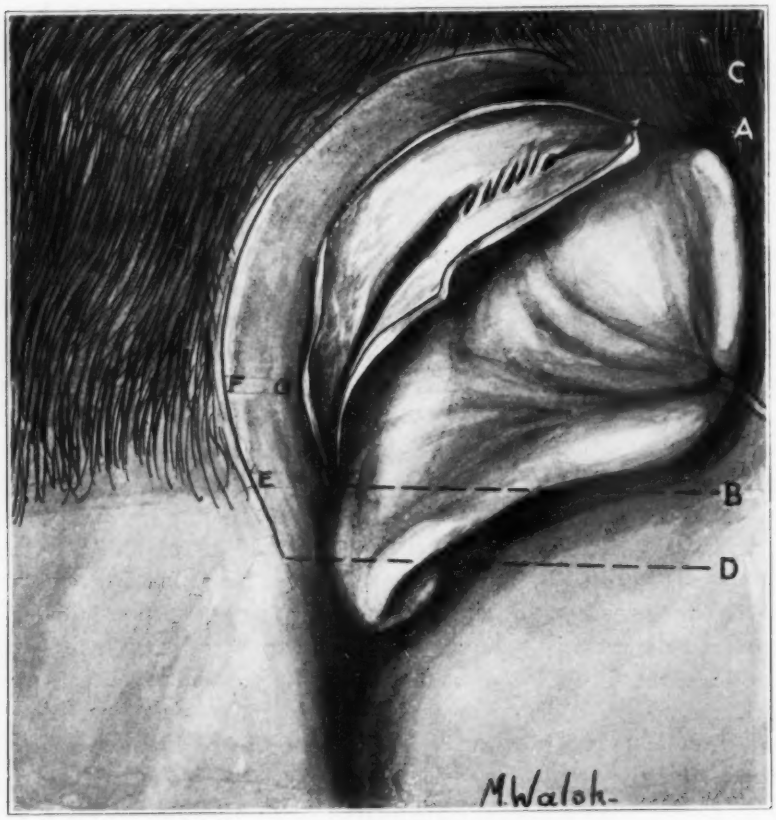

Fig. 1.—Procedure in radical operation on the mastoid.

(*CD* in fig. 1) is made through the skin only beginning a little back of the upper point of the first incision and passing downward and backward, finishing at a point parallel to, but about one-half inch posterior to, the first incision. The skin is dissected backward toward the occipital bone, and an incision is made through the periosteum parallel to the last one through the skin, but about three-eighths inch posteriorly. It is well to have the periosteum especially wide in the central part of the graft in order that the mastoid cavity be covered as completely as possible. The skin posterior to the last incision is undermined for a distance of about 3 inches to allow for the closure of the wound. This is not difficult if the wound is closed without tension. Before detaching the

tip of the graft, an area (*BEFG*) at the base should be thoroughly denuded down to the vascular papilla of the corium. This area is the pedicle of the flap and lies between the two edges of the wound as it is closed. The denudation should be extended about three-quarters of an inch upward from the base of the flap. The tip of the flap is finally cut through down to the temporal muscle; the former is dissected back to the edge of the latter, and the periosteum is cut

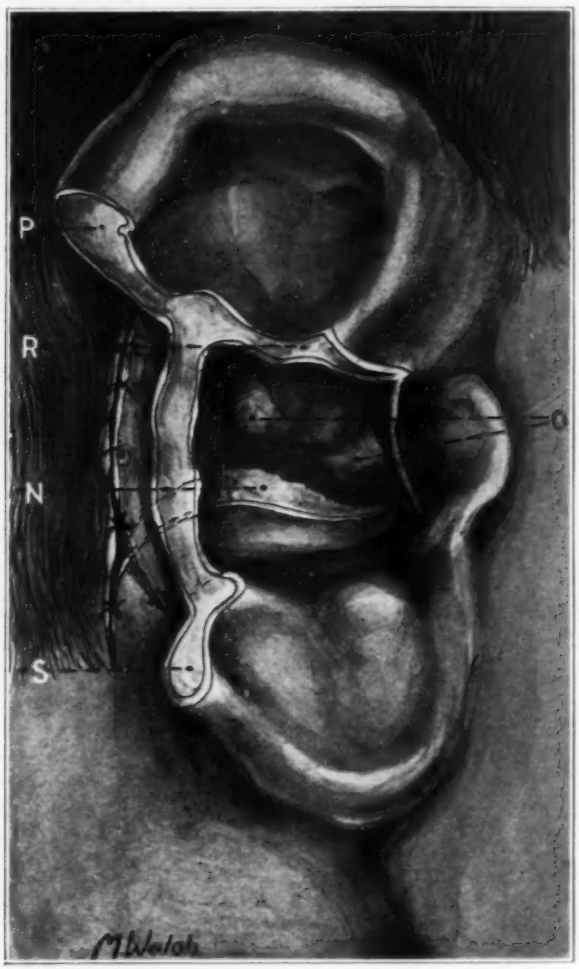

Fig. 2.—Second stage of operation.

through. The graft is placed in the mastoid cavity so that the tip of the graft covers the opening of the eustachian tube, as shown in figure 2. The wound is sutured shut as usual. Special attention is exercised in suturing through the pedicle and the anterior lip of the anterior incision at the tip of the mastoid (fig. 2). This is to keep the graft in position in the ear. The tissue *N* in figure 2 is extra width of periosteum taken from under the scalp.

The flap in the posterior wall of the auditory canal should be made in a definite way. The flap is essentially the one devised by Ballance. The entire posterior wall is turned upward and sutured with silk-worm ligature through the posterior auricular fold and knotted externally. This method of suturing allows a complete removal of the suture from this region and prevents a point of irritation and infection afforded by embedded catgut suture in the process of being absorbed. This large flap covers the large bony area *O* in figure 2. We have found that a satisfactory method of separating the skin from the cartilage of the auditory canal is to deal with the situation as if we were making a submucous resection of the nasal septum. The most external verticle incision is made through the skin only. Then the skin is elevated as much as is necessary with the Feer elevator. Then incision into the skin is finished and the cartilage and other tissue are removed as usual.

A light packing of iodoform gauze is inserted just tight enough and large enough to keep the graft in contact with the bone. On the third day, this packing is removed, and the ear is never repacked. The wound back of the ear is covered with dressings, but the external auditory canal is left open to the air and protected by wire gauze covered with two layers of cotton gauze.

REPORT OF CASES

CASE 1.—A girl, aged 12, had had a discharge from her left ear most of the time since infancy. Antiseptic and cleaning treatment was instituted for nearly two months but the condition did not clear up or show improvement. The girl could not hear a whisper in this ear.

A radical operation was performed on the mastoid according to the described technic with the following variations: Instead of denuding of the base of the flap graft, the base was cut off and turned up into the mastoid cavity at the end of ten days. The meatal flap was fixed in place with a buried catgut suture.

The packing was not kept in the ear over three days. The discharge continued about four weeks. The graft did not slough, and the operation was successful. Two years following the operation, the ear was still dry and free from scales.

CASE 2.—A girl, aged 18, had had a discharge from her right ear since infancy. Medical treatment had been unsuccessful. Operation was performed as in case 1. The detached base of the graft furnished more skin than was necessary, and this had to be trimmed several times. Packing was not used after the third day, but the discharge continued for three weeks. The mastoid cavity is now lined with solid thick skin. The ear is dry.

CASE 3.—A boy, aged 14, had had a chronic otitis media of the right ear since infancy. Medical treatment had failed to relieve him. The foregoing technic of radical operation on the mastoid was used. Packing was not used after the third day. The boy went home at the end of ten days. Medicine or dressing was not used during the following two weeks.

At the end of that time, the wounds were healed, and the ear was dry. The mastoid cavity was well lined with solid skin. Two years have passed since the operation, and the ear is still clean and dry.

CASES 4 and 5.—Children with acute mastoiditis in addition to chronic suppurative otitis media were operated on six months before this report was made according to the foregoing technic. The results were satisfactory and the ear cavities were very well lined.

Our technic in the radical operation on the mastoid seems to have several advantages. 1. The final mastoid cavity is a more natural cavity than that obtained by other procedures. 2. The graft grows readily and is as extensive as necessary. 3. A secondary operation is not necessary. 4. There is less sagging of the ear because of the shortening of the skin over the mastoid. 5. After-treatment is lessened, and packing is reduced to three days.

SARCOMA OF THE NASAL BONES

SUBTOTAL REMOVAL OF THE NOSE AND ITS RECONSTRUCTION

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ST. LOUIS

The fear of mutilation is often the strongest factor in causing delay of proper treatment for many surgical conditions. Were it not for this great fear, more than half of the patients with cancer (according to my own rough impression gained in a clinical experience of more than twenty-five years) would come to operation much earlier.

People seem to have a strong aversion to any procedure that will so change their form, externally or internally, as to cause them to feel that they are imperfect in the least degree. Not only do they not wish others to be cognizant of their imperfections, but their own consciousness thereof sometimes causes within them a state of mind not compatible with complete happiness.

The surgeon has long been aware of this trait in human psychology and endeavors while doing the necessary mutilation to proceed in such a way that the ensuing deformity may be minimal. Restitutio ad integrum is the ideal—of course, it is never realized. But because the final result will still be far from perfect, should one advise the patient to "bear the ills he has"?

The treatment of malignant growths about the face must often entail disfigurement, but many patients would accept operation sooner if plastic reconstruction were more widely practiced. The time required is more of a deterrent than the entailed suffering, but perhaps means will be discovered whereby this can be shortened.

The case which I will present aroused my interest in the general subject of sarcoma of the nose, and I set out to learn something about it.

I have not found any case similar to mine. In only one of all the patients examined was the frame or wall of the nose involved. In none of the others was there either destruction or restoration of the nose.

Is a tumor of the septum, of the ethmoidal or sphenoidal cells, of the nasopharynx or of the maxillary sinus a tumor of the nose in the ordinary sense? I think it is not. Most of those reported in the bibliography are these types.

There is a rather general belief (and it is well justified) that sarcoma anywhere is a serious disease and that the prognosis is usually bad. Sarcoma of the bone has even a worse prognosis, especially the round

cell type. Sarcoma can exist within the sinuses for a comparatively long time before its presence can be detected even by the most skilful rhinologist. But when the diagnosis has been made, the treatment ought to be instituted quickly, and so far the consensus of surgical opinion is that radical removal offers the best prognosis.

Some cases are recorded in which the removal was done through the nostril at several sittings. This practice, even though it may have been attended with success in certain cases, is, nevertheless, one that I consider unscientific in dealing with any form of malignant growth within the nose.

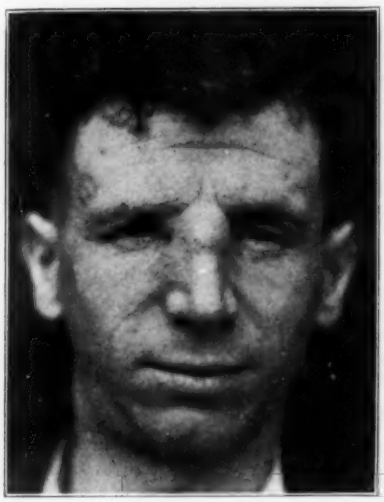

Figure 1

Figure 2

Fig. 1.—Round cell sarcoma arising from nasal bones. The extent to which it encroaches on the right orbit should be noted.

Fig. 2.—Profile view of condition shown in figure 1.

REPORT OF CASE

J. T. of Clinton, Ind., a coal miner, aged 36, was referred to me by Dr. Joseph Peden in February, 1923, because of a tumor mass growing on his nose. It started eight months before as a slight painless swelling at the root of the nose, and the patient attributed it to an injury received accidentally while at his work about one year previously. It was of irregular shape (figs. 1 and 2) and seemed to involve the walls and roof of the nose from the frontonasal juncture downward to just below the upper limits of the cartilaginous portion. It was firm to the touch, somewhat resilient and fixed to the bones, and the overlying skin was fixed to it in its upper medial portion. The growth extended downward and outward over both nasal processes of the superior maxillae but farther on the right. It also extended farther into the orbit on the right side. It had grown rapidly in the three weeks before examination; it was not tender or hot. The color of the skin over it was unchanged, except that the veins were plainly visible.

The patient complained of persistent frontal headaches which were worse on the right side and sometimes so severe as to keep him awake. There was profuse mucopurulent discharge sometimes containing blood clots from the right nostril.

The man was of Polish birth, was of a small, wiry build, had hitherto been healthy and was the father of six healthy children. His appetite was good, and

Fig. 3.—Roentgenogram taken before operation. Nasal bones are not visible; neither are the nasal processes of the superior maxilla.

he had not lost weight. There was a mass in the upper part of the right side of the neck between the sternomastoid and the angle of the jaw. It was firm, circumscribed, movable, about the "size of a pigeon's egg" and not tender. The temperature was 98.2 F.; pulse rate, 72, and respiration, 20. The Wassermann reaction was negative. Examination of the blood revealed: white blood cells, 6,400; red blood cells, 4,290,000; hemoglobin content, 90 per cent; polymorphonu-

clears, 50 per cent; small lymphocytes, 43 per cent; large lymphocytes, 6 per cent; eosinophils, 1 per cent.

A roentgenogram of the skull in lateral view showed that the nasal bones and nasal processes of the superior maxilla had almost entirely disappeared (fig. 3). A roentgenogram of the chest failed to reveal any metastatic deposits in the lungs. A general physical examination did not reveal any other pathologic changes.

The rhinologic examination was made by Dr. C. F. Pfingsten, who reported that the interior of the nose was perfectly clear except for a mucopurulent discharge from the right fronto-ethmoid region. The diagnosis was not certain. I felt that the condition was a neoplasm, but in spite of the negative Wassermann reaction the patient was given three full doses of arsphenamine and a course of treatment was started consisting of potassium iodide, 20 grains (1.3 Gm.), three times a day,

Figure 4

Figure 5

Fig. 4.—Showing roughly what was accomplished at the first operation.

Fig. 5.—Lateral view of condition shown in figure 4. The small portion of septum projecting should be noted.

the dosage being increased 2 grains (0.13 Gm.) daily. This was continued for ten days, but the tumor continued to increase in size, and operation was decided on.

Figures 4 and 5 show roughly what was done. I tried to keep the incision at least half an inch (1.27 cm.) away from the palpable edge of the growth.

Operation, March 5, 1923: An incision was made under ether anesthesia through the most prominent part of the mass down onto the right nasal bone; all the soft structures had lost their natural appearance and were changed to a solid, grayish-white homogeneous tissue. The bone was soft and also involved in the growth. I could not tell whether it had begun in the bone, periosteum or overlying tissues. The growth itself was not vascular. A portion was given to Dr. Ralph Thompson, pathologist, who pronounced it small round cell sarcoma probably of bony origin (figs. 6 and 7). I then cleaned the wound with the

Fig. 6.—Section of tumor under low power.

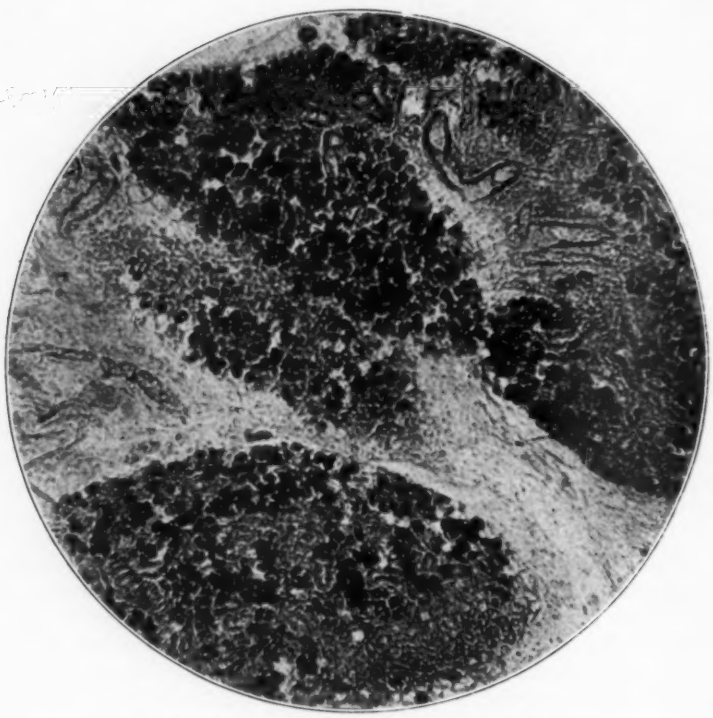

Fig. 7.—Section of tumor under high power.

cautery and began the operation: A transverse incision was made 1 inch (2.5 cm.) above the root of the nose, about 5 or 6 cm. long, downward and outward from either end of this through the inner canthus on the left, through the inner third of both lids and conjunctiva on the right, downward on each side to the middle of the nasolabial fold and then across the nose joining both ends of the vertical incisions.

The following bony parts covered by their overlying soft parts were removed: both nasal bones and both nasal processes of the superior maxillae; all turbinals on the right side, the superior, middle and anterior two thirds of the inferior turbinal on the left; all of the right, and anterosuperior half of the left, lachrymal; all of the right ethmoid except its cribriform plate. On the left the cribriform and orbital plates alone remained. The antero-inferior wall of the sphenoidal cells and the inner wall of the right antrum and the lower half of the anterior wall of the frontal sinuses within the limits of the incision, were removed. The frontal sinuses were filled with grayish, somewhat jelly-like, semi-translucent polypi, some pedunculated, other sessile; these were all scraped out.

Figure 8

Figure 9

Fig. 8.—The pedicle of the flap. Two incisions, parallel and about 4 cm. apart, were made, cutting through the skin and platyzma. This strip was lifted up (leaving it attached at both ends), the external jugular vein being carried with it, and its edges were sewed together, skin surface out. The defect due to the lifting of this flap was closed by undercutting the skin and sliding the edges together.

Fig. 9.—The flap was placed at the lower end of the pedicle. This was lifted up from the underlying tissues making a sort of pocket, blind end upward. A flap was then lifted from the postero-internal aspect of the arm base upward. This arm flap was then thrust up into the pocket, its raw surface turned forward to grow fast to the overlying flap. The base of the arm flap was cut at its entry to the pocket.

The inner third of each lid on the right side and the superior half of the septum from the sphenoid to the alae were removed. The right orbital fat now protruded into the nasal cavity, and it and all other raw or bleeding surface was well charred with the cautery at black heat, the ether being discontinued. The wound was dressed with iodoform gauze to which petrolatum had been generously applied; the right eye was protected by a rubber dam smeared with petrolatum.

The patient was in such good condition that it was decided to remove the glands from the right side of the neck; the upper were enlarged and adherent to the overlying sternomastoid; the upper half of this muscle was, therefore, included in the mass removed from the neck. (Microscopic examination of this mass proved it to be round cell sarcoma.) He made a good recovery and left the hospital March 29, 1923.

He returned June 18, 1923, apparently in good health, and the plastic repair of the defect was begun.

Operation, June 25, 1923: Under local anesthesia two parallel incisions, about 4 cm. apart, were made on the left side of the neck from just behind and below the angle of the jaw to about the middle of the clavicle, cutting through the skin and platyzmamyoides. This strip was lifted up (leaving it attached at both ends) the external jugular vein being carried with it, and its edges were sewed together, skin surface out. The defect due to the lifting of this flap was closed by undercutting the skin and sliding the edges together (fig. 8).

Fig. 10.—The flap was thrown up into position.

Operation, Oct. 19, 1923: A flap 5 by 5 cm. was turned up, its pedicle being just below the lower end of that raised at the last operation, and returned to its bed.

There was a growth on the anterior margin of the septum about its middle. It was nearly 1 cm. in diameter, and looked like granulation tissue. The perichondrium was incised along both sides of the septum 1.5 cm. from the growth and parallel with the free margin of the septum, and all septum anterior to these incisions was removed. Dr. Dolley, professor of pathology, St. Louis University, later pronounced this growth round cell sarcoma.

Operation, Nov. 9, 1923: The flap made at the last operation was raised. It bled freely. A flap 6.5 by 5 cm., base upward, in the axilla was raised from the postero-internal surface of the left arm. The defect was partly closed. This flap was turned up and its raw surface placed against the raw surface of the first one, and their lateral edges were sutured together. The arm was dressed in the Velpeau position for fractured clavicle to prevent tension. About two weeks later, the pedicle of the flap from the arm was cut, and the original flap, which now

had skin on both surfaces and was fed through a tubed pedicle, was ready to be lifted into position (fig. 9).

Operation, Jan. 3, 1924: The edge of the defect in the face was freshened by excision of the scar along its right side, its superior border and its inferior border. The scar uniting the edges of the two layers of skin of which the flap was composed was removed, and it was fastened into place with interrupted sutures—catgut for the inner layer and fine silkworm gut for the skin (fig. 10).

Fig. 11.—Patient as he appeared at the time this paper was written.

Operation, Jan. 23, 1924: The pedicle of the flap was cut and removed. The edges of the flap where the pedicle had been severed were separated. The scar was removed from the left edge of the defect in the face, and the edges of the flap were sutured to the mucosa lining the nose and to the skin of the face and left ala.

Operation, June 13, 1925: A transverse incision 1 inch (2.5 cm.) long (scar removed) was made in the scar on the forehead in the midline. The skin and periosteum were reflected upward. The flap was tunneled downward in the midline to the tip of the nose. Gentle pressure was applied to control the bleeding. An incision was made over the right sixth costal cartilage, and this cartilage, with

2 cm. of the attached rib, was removed. It was trimmed to proper length and thickness and then inserted into the tunnel in the nose flap; the rib end, denuded of periosteum, was placed under the periosteum of the frontal bone and fastened in place with removable silkworm gut sutures.

This raised the nose considerably, but further transplantation of cartilage was necessary. One was made from below in the midline lifting up the columnella and nose tip, and two more were done at the sides between the eyes butting below against the superior maxilla and above against the first cartilage inserted, roof-like. The root of the nose was quite firm, but the support for the tip was not so

Fig. 12.—Front view of condition shown in figure 11. The support for the tip of the nose was not so good, but the patient seems satisfied with it. He breathed well through it.

good; however, the patient seemed satisfied. He breathed well through it and, rather to my surprise, had no frontal sinus symptoms, which showed that his frontal sinuses drained well (figs. 11 and 12).

This round cell sarcoma presumably arose from the nasal bones or their periosteal covering and was accompanied by metastatic deposits in the regional lymph glands and their overlying muscle; a local recurrence took place seven months later. More than four years have now passed, without sign of recurrence or metastasis.

The patient was given both Coley's fluid and roentgen-ray treatment at intervals during the first eighteen months, as were some others of my patients with sarcoma who surprise me by continuing to remain alive and well. Although at present I am of the opinion that radiation (either roentgen ray or radium) and Coley's fluid should always be used in similar cases, I feel that before these are resorted to a competent surgeon should have done his utmost to remove the growth, and not only the growth but the regional lymph glands, even though sarcoma is popularly believed not to metastasize by way of the lymphatics.

NOTE.—The patient received his entire course of treatment at the St. John's Hospital, St. Louis. All of the figures are actual photographs which have not been changed or retouched.

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TRAUMATIC LOSS OF SUBSTANCE OF A NOSTRIL

RHINOPLASTY WITH A DERMO-EPIDERMIC GRAFT *

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I shall report the case of a young girl who consulted me for a loss of substance of the left nostril, which I restored by means of a dermo-epidermic flap taken from the arm. As the injury is almost always repaired with a flap taken from the cheek, with a pedicle in a state of continuity, I believe it will be interesting to publish the technic that I employed, and the results I obtained; this, as an entity, presents a new method.

REPORT OF A CASE

History.—Miss V. L., aged 17, consulted me on Aug. 25, 1926, for a wound in the nasal region. She told me that at the age of 8 years she had been bitten on the nose by a horse. She was not treated by a physician at that time and could not furnish me with any information about the consequences of the trauma.

On examination, I found a loss of substance of the left nostril, which may be compared to a pyramid the base of which is at the tip of the nose. The ala of the nose, at the junction of the nasolabial folds, was normal, and the wound was solely localized at the tip. At this region, the vestibule was open to a large extent. The tearing of tissue had also reached the columella, which was lowered. There was a depression of all the lateral part of the injured nose. The skin, which was very thin at this place, was distended by the cartilages.

Anterior rhinoscopy permitted me to see that this nostril was not obstructed.

The right nasal fossa was normal. Nothing interesting was noted in the pharynx and cavum.

In the presence of this lesion, I had to choose a plastic process which was likely to give the best possible esthetic results, and which at the same time offered the greatest chances of success. The Italian method, by means of a flap taken from the arm or on the region of the first interdigital palmar surface, was not indicated, because it would have been difficult to shape the skin in such a way that there would not be any atresia of the nostril and any asymmetry of the alae of the nose. The Roux method, which consists in using a successive migration graft, was not to be employed. The same can be said about a flap with a long pedicle taken on the forehead, the temple or the neck, because in supposing that the operation should have succeeded, the patient would have presented a cicatrix, which was to be avoided as much as possible. I could have made a semicircular cutaneous incision of about 15 mm. in height in the nasal region, limiting the loss of substance. After dissection had been performed and the skin lowered sufficiently to repair the ala of the nose, the wound would have been filled up immediately, or, still better, this could have been done later by means of a Wolff's graft taken on the pavilion of the ear.

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* Read before the Congrès de la Société Française d'oto-rhino-laryngologie, Paris, October, 1927.

In the present case, the classic method consists in using a flap taken from the cheek and folded on itself or anteriorly epidermized with a Thiersch graft. However, it must be admitted that the schemas of the authors illustrating this method rarely confirm the cosmetic results observed after the operation. Indeed, if the flap borrowed from the cheek or the palpebral region is a trifle large, the result after the closing of the wound is always a lifting up, a traction toward the tip of the ear of the labial commissura or an ectropion of the eyelid on the side corresponding to the operation. It must not be forgotten that in order to fill up the loss of nasal substance in my patient, it was necessary to use a large enough fragment of skin of pyramidal form, the base of which should have been

Fig. 1.—Traumatic loss of substance of the nostril by a bite from a horse.

in the direction of the ear, and that in consequence, its taking would have surely produced one of these phenomena and also an ungraceful cicatrix on the face. Admitting these considerations, I decided to perform rhinoplasty with a dermo-epidermic graft taken on the arm, and my patient went to Notre-Dame Hospital on August 30 to be operated on the following day.

Operation.—After having cut the hairy follicules of the vestibule, I irrigated the nostrils, asepticized the operative field and injected a solution of procaine hydrochloride and epinephrine. As the columella had been lowered at the time of the traumatism and the skin which covered it was cicatricial and thin, I incised the most prominent part, which was limited by the mucous membrane, and removed all the cartilage in order to allow a more esthetic coaptation and a better nutrition of the flap which would be lowered later. The ala of the nose was then cut in its

middle, parallel to the orifice of the traumatized nostril, from the nasolabial folds, and this incision followed the contour of the tip of the nose to rejoin the first cut (fig. 2).

After all the cicatricial tissue of the end of the nose had been removed, I freshened the inferior part of the summit of the flap that I lowered, and sutured it carefully to the tip of the nose, and to the skin of the columella. Allowing for a retraction of this nostril later, I performed the operation in such a way as to obtain an overcorrection. It remained for me then to fill up an operative loss of gaping substance, which had the form of a pyramid of about 2 cm. in length by 12 mm. in breadth at its base. After establishing asepsis and giving local

Fig. 2.—Incision made on the nostril.

anesthesia, I took from the arm a dermo-epidermic graft slightly covered by fatty tissue and sufficiently large for my purpose. The cutaneous flap, similar to a bridge, was sutured with silk to the nasal region with conjunctival needles, and the wound of the arm was closed in turn. Light compressive dressings with iodoform gauze were applied to the interior of the nostril and on the arm. As to the exterior, an ordinary dressing with simple gauze was applied, after a piece of medicoplast [1] had been placed on the operated region. During the first weeks, I

1. Medicoplast, called "aute gras" in French, is composed of the following substances: paraffin, 20 Gm.; castor oil, 120 Gm.; balsam of Peru, 2 Gm. This preparation is employed with a special gauze containing numerous holes—sterilized by heath. As can be seen by this formula, the gauze does not adhere to the wound.

changed the gauze in the nose to give a good support to the graft without distending it. Postoperative sequelae were normal, and I obtained a union by first intention. From the sixth day, I began to remove the stitches. The nasal bridge was well incorporated in the surrounding tissues, and its nutrition was excellent. Its adipose layer retracted gradually and was covered by the mucous membrane of the nostril which encircled it at the interior. During the following months, the graft diminished a little in volume and underwent a slight tension by the tissues which surrounded it. The purpose of this phenomenon was to reestablish the symmetry of the nasal fossae, on account of the overcorrection during the intervention, and to prevent the ala of the nose from becoming depressed. The nostril was not diminished in size, and anterior rhinoscopy scarcely

Fig. 3.—Appearance of the patient eight months after rhinoplasty with a Wolff's graft.

permitted one to see the place of operation. The scars were slightly visible, and the flap was of the same color as the tissues which surrounded it[2] (fig. 3).

This observation is interesting, especially from two points of view. It shows, first, that it is possible to repair a nostril by means of a dermo-epidermic bridge without a pedicle and, second, that it is not necessary

2. This patient, then almost cured, was presented at the Notre-Dame Hospital to the members of the IXiéme Congrès des Médecins de Langue Française de l'Amérique du Nord, on Sept. 22, 1926, and one month later, when she was cured, to the members of the American College of Surgeons.

that this flap should be folded on itself or anteriorly carpeted by a Thiersch graft. In the present case, I was justified in attempting this experiment, because if the insufficiently nourished flap had become mortified, I could have had recourse to another method later without having much diminished my chances of success by this first operation.

There remains for consideration the fact that I did not epidermize the adipose layer of the graft before applying it to the nasal wound. Authors advise the employment of this first operative step when it is necessary to fill up a loss of substance over a cavity if this has not been accomplished by a cutaneous plan at the time of the autoplasty. My course was decided by the fact that the flap in my case would be surrounded by an almost entirely healthy tissue, which I could support by means of dressings in the nostril, and that, in consequence its nutrition would be good. Moreover, the adipose layer retracted in time and has been covered by the surrounding mucous membrane.

As far as the folding up on itself of a free dermo-epidermic graft is concerned, this technic would not have been practicable in my case.

A graft, with a pedicle, might be taken from the cheek. The graft would necessarily be large enough to fill the cavity of about 2 cm. in its largest diameter and would be in the shape of a triangle with its base directed toward the auricle region. It must be admitted, however, that after the coaptation of the lips of this wound, there would be, besides the scar, a raising up of the labial commissura and perhaps an ectropion of the inferior eyelid.

When there is a loss of substance on a nostril similar to that in my case, the ideal method consists in using a free dermo-epidermic graft. This flap may contain a slight layer of adipose tissue or be carpeted by a Thiersch graft. It must be carefully sutured with silk, small conjunctival needles being used, and in order to protect it, the first exterior dressings must be practiced in using medicoplast, and the interior dressings, iodoform gauze, slightly compressed. When the operation is performed in this manner, it gives the best esthetic results possible to obtain.

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THEORETICAL INTERPRETATIONS OF THE FUNCTIONAL TESTS

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Functional tests of hearing are usually relied on to differentiate obstructive from nervous conditions of the auditory apparatus. The criteria on which otolaryngologists base their diagnoses and quote almost as laws, briefly stated, are: 1. Nerve deafness is indicated whenever the ear senses the higher tones of the musical scale subnormally, and especially if the so-called limit of upper tone is lowered. 2. Obstructive deafness is indicated whenever the ear senses the high tones well but the lower tones with increasing difficulty as the scale descends, and especially if the so-called limit of lower tone is raised. 3. Bone conduction of shortened duration is taken to mean nerve deafness, whereas, if it is normal or lengthened actually (or even relatively), it is taken to denote obstructive deafness. The tests of Weber, Rinne, Schwabach and Gellé all involve bone conduction. I shall not, however, discuss bone conduction at this time.

Graphically (by audiogram) pure nerve deafness should show a curve sloping downward from left to right, and obstructive deafness should show a curve sloping upward from left to right. Combined nerve and obstructive deafness should show a curve with both the right and center and left more on a level, hence sloping little if any up or down.

I shall endeavor to show that whereas some of these criteria may prove trustworthy in certain cases, their universal application would be misleading and theoretically at variance with experimental data and acoustic laws.

Obstructive lesions are those which in any way interfere with the normal transmission of sound through the middle ear; in other words, anything which impedes or otherwise modifies this transmission.

FACTORS WHICH CONTROL THE PROGRESS OF SOUND WAVES

Acoustically, there are three factors or attributes which control the progress of sound waves through any conducting or transmitting system such as that of the ear. These are: (1) inertia (weight), which impedes acceleration or change in velocity; (2) elasticity, which impedes displacement, and (3) friction, which impedes motion or velocity. These three mechanical properties act singly or together in various ways.

Different parts of the conducting mechanism may transmit vibrations of sound to the inner ear by more than one mode or direction of motion; however, it is probable, and I shall therefore assume, that there is one mode of transmitting vibrations which is common to normal ears, and which may therefore be called the normal mode of vibration.

If it is assumed that the vibration of the different parts of the conducting mechanism takes place as usually described in the textbooks, then it is comparatively simple to predict, qualitatively at least, the effect on an audiogram of any simple type of conductive lesion (for example, weighting of any or all of the parts which would decrease particularly the high frequencies).

The physical or mechanical make-up of the conductive mechanism of the ear is such that it cannot but be inefficient at both the low and the high frequencies, and relatively more efficient in some intermediate range of frequencies. One would expect it to be inefficient at the low frequencies, mainly because of the elastic constraint of its parts (attachments to surrounding structures), and at the high frequencies because the mechanism is composed of several vibrating parts, and there is an elastic give in the connections between these parts and an inertia from weight.

In the midfrequencies one would expect the mechanism to be most efficient because weight and elasticity counteract each other. This range is determined by the relative size of the parts and their associated elastic constraints. It is this mid-range which is most important in hearing, but not necessarily in diagnosis. With these principles and assumptions in mind, it will be interesting to outline the general effect of a few simple obstructive lesions on the curve of hearing (the audiogram).

To group the various lesions under three headings, depending on their effect on changes in inertia, elasticity and friction appears logical (ignoring for this purpose other effects produced, whether such effects accentuate or detract from the one considered).

Increase in Inertia.—Inertia may be increased by the following: wax along the handle of the malleus; increase in the size of the ossicles from osteitis; deposits of calcium on the ossicles or drum; congestion of periosteum of the ossicles or drum membrane; exudate or cholesteromas in attic bearing down on the incus and malleus, and ebonization of the ossicles. Weighting (inertia) per se will affect principally the conducting mechanism for the higher frequencies, but of course, changes in elasticity or friction accompanying the weighting may either accentuate or lower this effect, depending on which dominates. There are few, if any, lesions which cause a pure weighting effect, but this can be produced experimentally by gluing a weight to the umbo.

EXPERIMENT 1.—A flattened shot weighing 85 mg. was firmly attached over the umbo (the hearing in this ear was down about 30 sensation units), and after sufficient time was allowed for the ether solvent of the adhesive to evaporate thoroughly, audiograms were made first of the hearing with the drum membrane of this ear horizontal and second with the drum in the normal vertical position. These audiograms are shown in chart 1, also the hearing of the ear without the shot attached to the umbo. The effect was as anticipated and is clearly shown in the difference curve in the same chart. The lower tones are little if at all affected, and the higher tones are perceptibly and even definitely lowered. (In the horizontal position, the increased tension tends to outbalance the effect of the weighting for the highest notes.) Even with such a simple lesion as the one present in this experiment, other factors tend to alter a pure effect from weighting, because by dragging the center of the drum slightly downward the weight

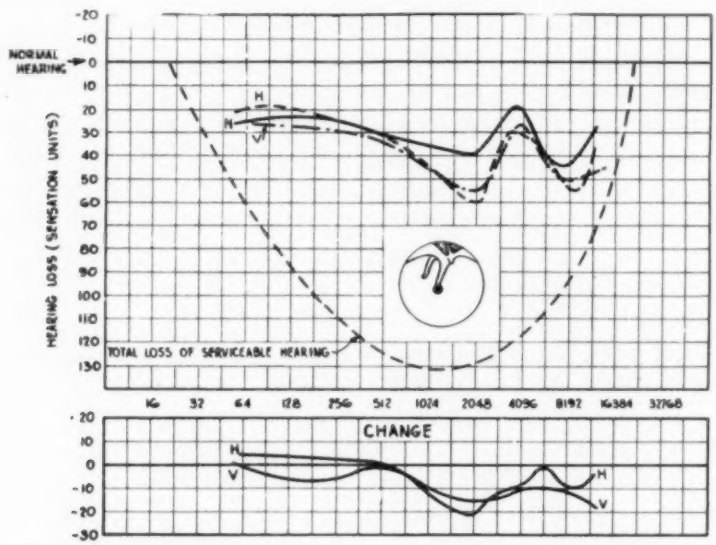

Chart 1.—Audiogram showing the effect of an 85 mg. shot attached to the umbo. Drum membrane in (*H*) horizontal, (*V*) vertical and (*N*) normal positions for this ear.

may have increased the tension of the upper half of the drum and slackened slightly the inferior half of the drum.

EXPERIMENT 2.—On the drum membrane of a normal ear a 85 mg. round shot was attached slightly excentric to the umbo, one periphery coinciding with the center of the umbo and its bulk slightly anterior to the umbo (on the adjacent drum). This placement was not intended, but the shot became attached a little off center (chart 2). Audiograms of hearing with the drum membrane in the horizontal and vertical positions in this case showed the reverse of what was anticipated, but the effect can be explained as follows: The lowering of the transmission of the low frequencies is due to the stiffening of the drum by the adhesive. The raising of the transmission of the high frequencies is caused by the tendency of the shot to stand still, and, being off center, it restrains the malleus elastically through the intervening membrane between the shot and the

umbo, which tends to favor these high frequencies by the increased elasticity. (At 11,000, however, there is a loss, but at the extremely high frequencies dependable deductions as to how the ear is operating are impossible at the present time.)

As graphically shown in chart 2, these two experiments also demonstrate how a small mass in a slightly different location may have a definitely reverse effect at the same frequencies. It proves that though the lesion is clearly obstructive, it may either lower or elevate the low or the high frequencies.

EXPERIMENT 3.—Chart 3 shows the effect of a centrally placed 85 mg. shot on another normal ear. In this case, the audiograms with the drum membrane in both the horizontal and vertical positions show a lowering of the curve at all frequencies, except in the extreme upper range where the curve is elevated when the drum membrane is in the horizontal position. In all of these experiments, the horizontal position favored the frequencies above 4,000. It is logical to conclude

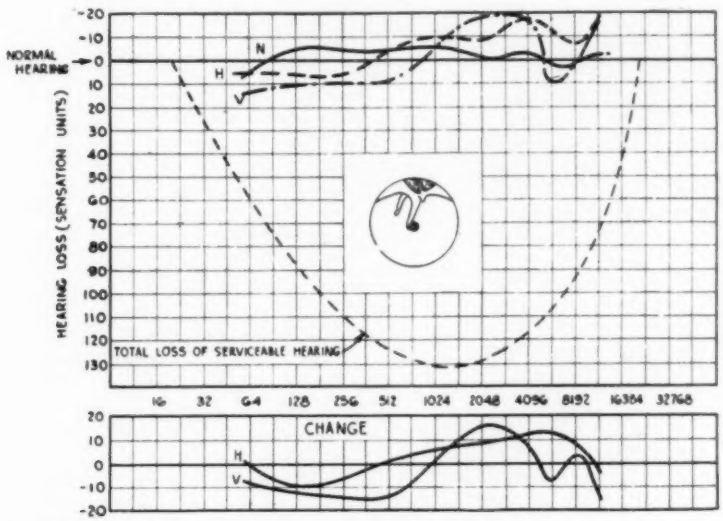

Chart 2.—Audiogram showing the effect of an 85 mg. shot attached slightly excentric to the umbo. Drum membrane in (*H*) horizontal, (*V*) vertical and (*N*) normal positions for this ear.

that this was due largely to the greater tension of the drum and conducting mechanism in the horizontal position as compared to the vertical. The lowering in the transmission of the low and midfrequencies is probably due to an increase in the stiffening of the mechanism, but this stiffness was unable to outbalance the lowering of the high frequencies from the weighing.

Since the placing of a shot on the umbo may produce such divergent results, the conclusion is unavoidable that even this simple lesion has changed the mode of motion of the parts of the conducting mechanism so that it differs from the normal. Any lesion tends to do this, and ears vary greatly; consequently, the same conductive lesion in different ears may cause exactly opposite effects on the audiogram. The lesion in these experiments was a large conductive lesion, because the shot weighed from two to three times as much as a malleus (23 mg. dry). Therefore variations from the normal that are not any greater

than those shown in charts 1, 2 and 3 do not give conclusive data for the differential diagnosis of conductive lesions, at least for those confined to the drum membrane or ossicles.

Increase in Elasticity.—Elasticity may be increased by thick scars in the drum membrane, ankylosis between the ossicles, ankylosis between the footplate of the stapes and the oval window margin, adhesions between the ossicles, adhesions between the ossicles and the skull and adhesions between the periphery and the drum.

Any elastic constraint to displacement impedes the transmission, especially of the lower frequencies, and so far as it neutralizes mass, aids the transmission of the higher frequencies.

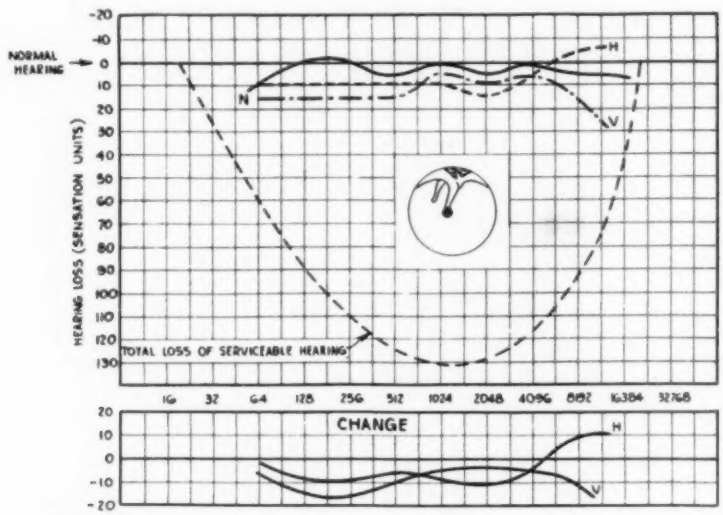

Chart 3.—Audiogram showing the effect of a centrally placed 85 mg. shot on another normal ear. (*N*) indicates the normal for this ear; (*H*) the horizontal and (*V*) the vertical positions.

Chart 4 shows a typical audiogram of a case of obstructive deafness from postsuppurative otitis. The lower tones are markedly depressed and the higher tones are little if any depressed, in spite of the fact that there is probably an increased weighting of the structures of the middle ear. This weighting effect evidently is more than overbalanced at the high frequencies by the increased tension, and at the low frequencies the tension increase is the determining factor in interfering with the transmission of sound. In these cases of increased tension the old criteria will apply, and it may truly be said that the obstructive lesion lowers the low frequencies and has little effect on the high frequencies. It appears probable that there are comparatively few obstructive lesions which do not cause some increase in elasticity.

Decrease in Elasticity.—Elasticity may be decreased by atrophic catarrh of the middle ear, by loose ligaments and few or flabby adhesions such as those occurring during or following long suppurations or by atrophic and thinned or flabby drum membranes such as those caused by excessive inflations. Decrease in elasticity must interfere with the transmission of the higher frequencies and also lower the middle and low frequencies, but the latter to a less extent. Here again it is difficult

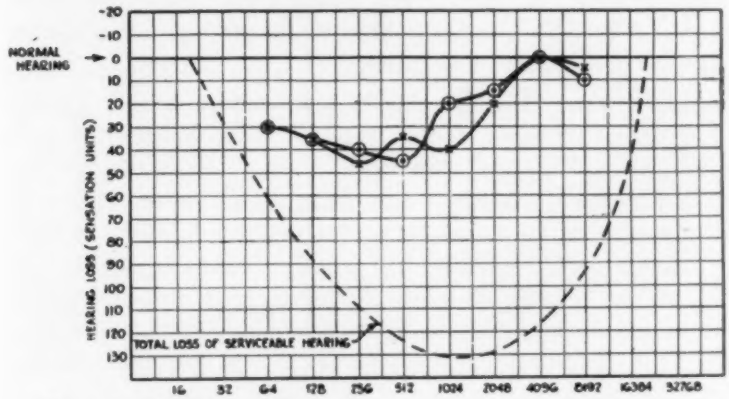

Chart 4.—Audiogram in a case of obstructive deafness from postsuppurative otitis.

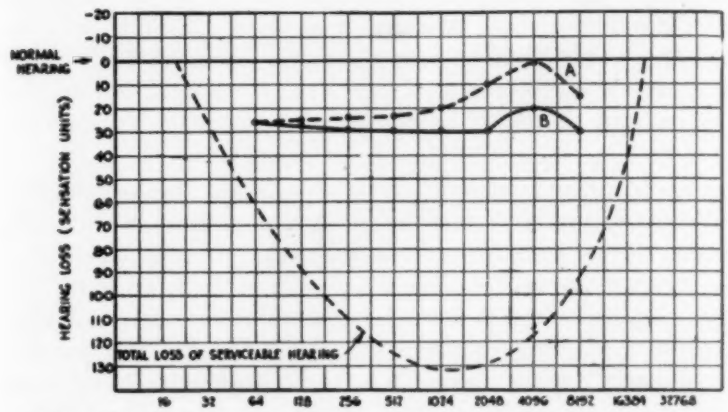

Chart 5.—Audiogram in the case of a patient with relaxed drum and movable malleus. (*A*) indicates record after inflation and (*B*) that before inflation.

to obtain anything like a simple loss in elasticity effect, because some weighting is unavoidable; however, chart 5 shows the auditorium in a case with relaxed drum and exceedingly movable malleus resulting from a long recurrent suppuration, now healed. Inflation of the middle ear markedly improves the hearing (temporarily, of course), because when the drum is stretched, its elasticity is increased and this slightly improves

the hearing for the middle, but markedly for the upper, frequencies. Even though some one suggests that a nerve is involved because of the loss of 30 sensation units at 8,000, nevertheless, the efficacy of the relaxation to lower and of the increased tension to elevate the high frequency transmission remains operable. In these cases, the standard criteria would be misleading. No one can say that the obstructive lesion affects the transmission of the high frequencies little, because it does just the opposite; in fact, it has affected all frequencies about alike, until the inflation has markedly brought up the higher tones. By inflation, the 'nerve deafness" was cured.

Increase in Friction.—Friction may be increased by densely scarred or edematous drums, closer adhesions between the ossicles, tighter fit of stapes into the oval window, diminished area of membrana tympani and adhesions between the cellar or attic and the ossicles or drum.

Friction depends on the viscosity of the movable bodies and their adhesion. Friction per se generally will operate by lowering chiefly the middle frequencies, because increases in inertia and elasticity which lower the high and the low frequencies respectively will tend to balance each other in the midfrequencies, leaving friction to dominate. Many audiograms show a general lowering of the middle frequencies.

Decrease in Friction.—Decrease in friction should tend to elevate at least irregularly the midfrequency range of hearing. Only one such lesion occurs to me, namely, a stricture or shutting off of the additus ad antrum. This would occur in cases of mastoid disease and disease of the attic and after the simple mastoid operation, but I have few graphs showing marked elevations at midfrequencies probably because the effects are contrary to those of the other lesions present.

It is seen, then, that even with simple lesions and the assumptions noted, the interpretation of changes in audiograms is difficult; but it is seen also that some so-called obstructive lesion in the conductive mechanism does not necessarily mean a lowering of the hearing for the low notes out of proportion to the hearing for the high notes, or that because hearing for the high tones is lowered more than that for the low tones, this may not be due to a so-called obstructive lesion, and not necessarily to nerve deafness alone.

Interpreted along the lines indicated herein, the audiogram, made either by the audiometer or by calibrated tuning forks, will be of invaluable aid to clinical observation, a greater aid, I believe, than any heretofore used by the otologist for differential diagnosis. It must, however, be used intelligently, just as any other method of measuring and charting the hearing capacity. To use it intelligently one must keep in mind the theoretical interpretations which most scientifically explain the phenomena elicited, and correlate these to other tests and clinical data.

Undulations (dips or crests) of from 15 to 20 sensation units are impossible to interpret in terms of obstructive lesions, because, as pointed out, any such variations may be due to a variety of causes, but even small variations in audiogram curves covering several frequencies or showing decided trends may be interpreted in terms of obstructive lesions.

114 East 54th Street.

DRAINAGE OF THE CISTERNA PONTIS LATERALIS IN OTOGENIC MENINGITIS

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I do not know who first proposed or performed the operation of drainage of the cisterna pontis lateralis in otogenic meningitis. Goerke,[1] whose report of five cases with two recoveries was the first reference I saw, mentioned Uffenorde and Holmgren, but I have not succeeded in finding the original reports. Blau [2] reported a case of sinus thrombosis, cerebellar abscess and meningitis in which recovery occurred after this operation; he also mentioned Hinsberg and Boenninghaus. I am not aware of any reports of this operation in the American literature.

Tilney and Riley mentioned, but did not describe, the "cisterna lateralis." It is not mentioned in either Cunningham's or Gray's Anatomy. The best practical description that I have seen is by Boss.[3] Practically and briefly, it is an arachnoid space, communicating with the cisterna magna, and extending outward along the posterior surface of the petrosa to a line that extends from the internal auditory meatus to the apertura interna canaliculus cochlea, including both these openings and the facial and acoustic nerves which are free in the cisterna.

Goerke [1] described his operation as follows:

> After the radical mastoid operation is performed (all his patients had chronic suppurations; the complete radical operation may not be necessary), the dura of the middle and posterior fossae is uncovered over a considerable area, the operator going back of the sinus in order to get sufficient operative space and to permit some displacement backward of the cerebellum. The bone in front of (mesial to) the sinus and behind and above the facial ridge is then chiseled away. If the labyrinth is infected, the operation is simplified by going through this structure; otherwise, Goerke halted his chiseling at the "Bogengang massif." Then with a septal elevator, he separates the dura from the posterior surface of the petrosa until at the meatus auditorius internus, the cushion-like projection of the cisterna can be seen. He kept just below the petrosus superior and, of course, above the bulbus juguli. The cisterna is incised for about 1 cm., an iodoform gauze strip inserted, and the operation is finished. The gush of cerebrospinal fluid prevents any further procedures.

REPORT OF CASES

CASE 1.—A boy, aged 12, was admitted to the Illinois Eye and Ear Infirmary as an emergency patient because of an acute condition of the mastoid, and was operated on in another service, Oct. 18, 1927.

1. Goerke: Ztschr. f. Hals-, Nasen- u. Ohrenh. **12**:144, 1925.
2. Blau: Ztschr. f. Hals-, Nasen- u. Ohrenh. **15**:289, 1926.
3. Boss: Ztschr. f. Hals-, Nasen- u. Ohrenh. **12**:143, 1925.

The left ear had discharged at intervals for the past two years. Seven days before admission to the hospital, the ear again began to discharge; the boy had had a headache and had vomited for the past three days, and had not slept for the past three nights. The left ear showed a slight postauricular swelling; pain was present over the tip of the mastoid; the posterior superior quadrant was bulging; there was distinct sagging of the posterior superior wall and perforation of the anterior inferior quadrant; the white cell count was 20,500. Neurologic data were not reported. A simple mastoid operation was done. The tip was found to be necrotic; free pus was present in the antrum.

On October 21, the white cell count was 33,700, with 89 per cent polymorphonuclears. The Kernig sign was positive; the neck was stiff; spinal puncture did not elicit any fluid.

On October 22, I was asked to see the patient, who was highly hypersensitive. He was grimacing and restless and complained of headache and backache. The temperature was 102.8 F.; he had a stiff neck; the Kernig, Babinski, Oppenheim, Chaddock and Gordon signs were present. When the plantar surface of one foot was stroked, both great toes extended; the child's appearance was bad, and the pulse was weak. Attempts to put him on the side in order to perform a spinal or cisternal puncture caused him to stop breathing and had to be abandoned. While the patient was only partly under the effect of general anesthesia (ether), I proceeded to complete the radical operation—to uncover the dura of the middle and posterior fossae. The dura was slightly injected; otherwise it was normal. The pulsation of the brain was normal; the sinus was normal except where it had been uncovered by the previous operation.

I uncovered the dura of the posterior fossa behind the sinus, then anterior (mesial) to it, making the bone dissection as in the Neumann operation on the labyrinth, except that I left a thin edge of the bone between the two fossae. The bleeding was profuse throughout, so that I was able to guide myself only by the probe and, in a general way, by my judgment of distance and anatomic relations by such landmarks as could be seen from time to time. When I judged that I was nearly to the internal auditory meatus, I began separating the dura from the posterior surface of the petrosa, soon releasing a flow of curdy pus, followed by a gush of cerebrospinal fluid. I then inserted a xeroform gauze drain. The plastic operation on the canal was not performed, and the wound was packed without suturing. Visual identification of the cisterna was prevented by the flow of blood and cerebrospinal fluid, and I did not stop to complete the operation on the labyrinth, although I must have cut across the posterior semicircular canal. Time was too valuable. The preoperative temperature ranged from 102 to 104. The highest postoperative temperature was 100.8; the temperature reached normal the fourth day and remained so. Intravenous injections of 10 cc. of 40 per cent methenamine were given on three successive days. The drain was removed after seventy-two hours; thereafter, the wound was lightly packed without pushing the drain down into the region of the cisterna. The day after the operation, there was a marked horizontal nystagmus to the right, and on the following day, the nystagmoid movement was present to both sides and upward. The nystagmus was still present to some extent three months after the operation. The other neurologic signs gradually disappeared, the Kernig sign remaining about three weeks, and the exaggerated knee reflex, six. Eight days after operation, the white cell count was still more than 20,000, but gradually returned to normal.

This case was reported at the November meeting of the Chicago Laryngological Society, and the patient was shown at the December meeting. Facial paralysis is not present, though the upward nystagmus remained. The boy is now back in school and is gaining weight and looks well.

CASE 2.—*History.*—D. A., a housewife, aged 29, was admitted to the hospital, Dec. 24, 1927. Both ears had discharged since childhood. In September, 1927, swelling was noticed behind the left ear; a mastoid operation was performed. The patient had been confined to bed with vertigo and vomiting when she lay on the left side. Four weeks after the operation, facial paralysis appeared on the left side. Her husband said that she had been totally deaf in the right ear for several years. For ten days preceding admission to the Illinois Eye and Ear Infirmary, the patient had been in a hospital in another city, delirious and under the influence of morphine. Five days before admission, swelling appeared behind the left ear, which ruptured through the skin.

There was a central and posterior superior perforation of the right ear. Examination of the left ear showed a purulent discharge in the canal, which was swollen; a postoperative mastoid scar with two small fistulas and general tenderness over the mastoid. Left facial paralysis was present; the pupils reacted to light sluggishly; the eyes showed spontaneous horizontal nystagmus to the left, third degree; the neck was rigid; the Kernig sign was present; the Babinski, Oppenheim, Chaddock and Gordon signs were absent. The patient's mental state was too cloudy for labyrinthine tests; she seemed to hear c_4 with the right ear; otherwise, she was apparently totally deaf in both ears. There was spontaneous past pointing to the right (?); the patient was in violent delirium, requiring restraint before the operation. The vertigo and ataxia, which had disappeared after the mastoid operation, recurred about two weeks before I saw her. The white cells numbered 20,500; the polymorphonuclears, 90 per cent. Examination of the urine showed a trace of albumin; no sugar; no casts or blood, and many epithelial cells.

The preoperative diagnosis was cerebellar abscess; meningitis.

Operation.—Spinal puncture revealed a turbid fluid under pressure; 30 cc. was removed. The cells numbered 9,280; the Pandy and Ross-Jones tests were reported as negative, but the fluid did not reduce Haines' solution.

The radical mastoid operation showed only a shallow depression about 1 cm. in diameter, in the cortex; this represented the previous operation; the bone was densely eburnated, tending to fracture (five gouges were spoiled). After the middle and posterior fossae were uncovered, the labyrinth operation, after the method of Neumann, was performed. At about the depth of the saccus endolymphaticus an accumulation of pus, the size of a lima bean, was encountered. The dura was separated from the posterior surface of the petrosa until the opening of the cisterna lateralis pontis released a profuse flow of cerebrospinal fluid. An iodoform gauze drain was inserted in the cisterna. Twenty cubic centimeters of a 40 per cent solution of methenamine was injected intravenously daily.

The delirium continued after operation but was mild, until stupor and eventual coma caused death on December 28. Morphine was not required after the operation. On December 27, palpation of the uncovered dura in both fossae revealed an easily compressible brain which pulsated normally. After death, exploratory punctures of the sphenotemporal lobe and the cerebellum did not disclose any abscess.

COMMENT

Although Linck[4] is pessimistic in regard to the success of this operation except in labyrinthogenous meningitis, of the six case reports I have found so far, recovery has occurred in three; to this number I

4. Linck: Ztschr. f. Hals-, Nasen- u. Ohrenh. **12**:55, 1925.

have added one in which recovery occurred and one that resulted in death. The patient in case 1 may not have had a diffuse meningitis, but I feel sure that without this operation the outcome would have been different. The respiratory inhibition, the spinal block, and the finding of pus deep in the posterior fossa, even though the laboratory investigation was faulty, are convincing.

This operation is distinctly an otologic procedure. It appears to be a logical approach for drainage in otogenic meningitis, and perhaps for other types, with a reasonable hope for recovery if the infection is still limited to the posterior fossa, although beyond the ear spaces. Undiagnosed depots of pus may be disclosed, and if the operation cannot cure patients with generalized forms of the condition, at least the persistent cerebrospinal drainage seems to relieve suffering and may obviate the necessity of repeated spinal punctures. The Haynes' operation necessitates a separate approach at the foramen magnum.

I have tried the operation twice on the cadaver. It may not be necessary to remove the bone as deeply as I did. In the cases that do not require the labyrinthine operation, Goerke stops at the "Bogengang massif" and begins separating the dura. To make room for the necessary displacement of the cerebellum, one must uncover the dura behind the sinus. Perhaps Portman's saccus operation will prove to give sufficient access. The dura is easily separable until one nearly reaches the cisterna, but pathologic conditions may change this. Incidentally, on the cadaver, the jugular bulb was accessible in front of the lateral sinus without endangering the facial nerve.

25 East Washington Street.

CEANOTHUS AMERICANUS

ITS EFFECT ON THE COAGULATION TIME OF THE BLOOD*

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AND
DWIGHT L. WILBUR, M.D.
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Ceanothus americanus is a shrub that grows abundantly throughout the mountain regions of the eastern part of the United States, and is found particularly in dry and barren woodlands. It is also known as Jersey tea, New Jersey tea, redshank, redroot, Walpole tea and wild snowball.

HISTORY

The use of preparations of this plant for the purpose of checking hemorrhage is far from being new. Almost a century ago, in 1836, Hubbard [1] reported that "a strong decoction of the bark of the root or the fresh root itself is a valuable styptic for restraining hemorrhage from wounds." The drug in this instance was applied locally, and its action was believed to be astringent and in all probability due to the tannin present.

The first mention in the literature of its administration internally for the purpose of checking hemorrhage occurred forty-three years later, in 1879, when Hammond [2] reported the use of it in the strength of 4 ounces (120 cc.) of a tincture of the root bark to 1 pint (475 cc.) of diluted alcohol. It was given in 1 drachm (4 cc.) doses every hour until, as Hammond quaintly says, "its wonderful effects are manifest."

Additional and similar pharmacologic observations were recorded by Gerlach [3] and Gordin.[4]

The drug was also used extensively and empirically for many conditions other than hemorrhage. Infusions of the entire plant or of the leaves, flowers, seeds, roots or root bark were given for syphilis, ulcerations of the mouth and throat, asthma, cancer, whooping cough, bronchitis, dysentery and gonorrhea.

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* From the Department of Otolaryngology of the University of Pennsylvania.

* Read by invitation before the Section on Otology and Laryngology of the College of Physicians of Philadelphia, Dec. 21, 1927.

1. Hubbard, D. H.: Boston M. & S. J. **15**:42, 1836.
2. Hammond, N. J.: Georgia Eclectic M. J. **1**:355, 1879.
3. Gerlach, F. G.: Am. J. Pharm. **63**:332, 1891.
4. Gordin, H. M.: Pharm. Rev. **18**:266, 1910.

PHARMACOLOGY AND PHYSIOLOGIC ACTION

During the early years of the drug's popularity, a chemical study of its active ingredients was not made, but in 1859 King [5] reported the results of such a study and said that among the ingredients present were tannin, a volatile substance (lignin) and an active principle called ceanthine. In 1926, Clark [6] isolated fairly pure alkaloids.

That the alkaloids of this plant have a definite hemostatic action has been shown by Groot.[7] Thoraldsen and Krawetz [8] believed that this effect is due to the catalytic action of the alkaloids, in the reaction between antithrombin and thromboplastin in the blood clotting process. The exact principle responsible for this has not been determined, but apparently several alkaloids which occur in both crystalline and amorphous form in the root bark tincture are essential.

Because of this probably catalytic action, it is impossible for the drug to produce coagulation within the vessel walls. It naturally follows that the coagulation time can be depressed so far and no further, regardless of the dose. The reaction is therefore qualitative and not quantitative.

UNTOWARD EFFECTS

Untoward effects were not noted during our studies, nor have any such effects been reported by other observers. Thoraldsen and Krawetz [8] stated that the drug does not produce any change in the blood chemistry nor does it affect the concentration of the calcium, potassium, sodium, magnesium, nonprotein nitrogen or sugar.

Groot [7] demonstrated that administration of this drug to the dog reduced the blood pressure, but this effect has never been found in man.

THE PRESENT STUDY

With the idea in mind that the administration of this drug might be a helpful factor in preventing or checking those hemorrhages which so frequently occur in otolaryngologic operations, we carried out a series of studies on sixty-two medical students of the University of Pennsylvania, who kindly allowed themselves to be used for the purpose.

First, the normal coagulation time of each student was taken. In order to check up our readings, we took the time twice before administering the drug in thirty of the sixty-two tested. We found an average variation in the two tests of twenty-four seconds, and we are allowing for this erratum in our conclusions. Then, doses of either 2 or 4 drachms (7.5 or 15.0 cc.) of the preparation we used were admin-

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5. King, J.: American Dispensatory, 1859, p. 20.
6. Clark, A. H.: Am. J. Pharm. **98**:147, 1926.
7. Groot, J. T.: J. Pharmacol. & Exper. Therap. **30**:275, 1927.
8. Thoraldsen and Krawetz: Am. J. Physiol. **79**:545, 1927.

istered, the blood drawn by cutaneous puncture and the coagulation time noted at three ensuing intervals, one-half hour, one hour, and one and one-half hours. In their studies, Thoraldsen and Krawetz [8] obtained the blood by venipuncture, as advocated by Petersen and Mills,[9] a method which probably would be slightly more accurate in its results than the one we used. In our experiments, however, this would have been unpractical.

In measuring the coagulation time, we used the capillary tube method of Todd [10] throughout.

RESULTS

The results of our tests are as follows:

1. The average normal coagulation time for the sixty-two students tested was five minutes and fifty-four seconds.

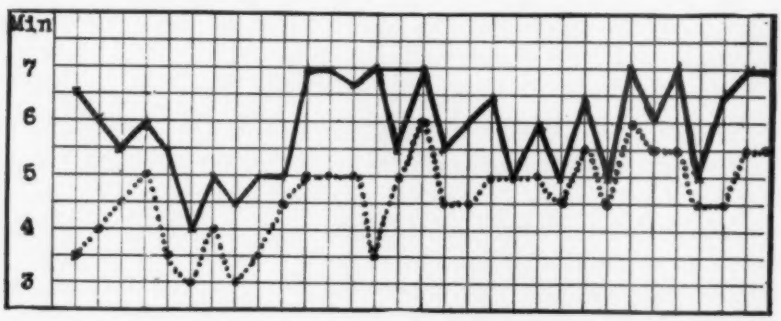

Chart 1.—The solid line indicates normal coagulation time and the broken line, coagulation time after administration of preparations of Ceanothus americanus.

2. The average variation in two tests of the normal in thirty of the sixty-two was twenty-four seconds.

3. The average reduction at one-half hour following a 2 drachm dose was one minute and forty-two seconds.

4. The average reduction in the same time (one-half hour) following a 4 drachm dose was one minute and twenty-four seconds.

It is notable here that the average reduction after a 4 drachm dose was sixteen seconds less than with a 2 drachm dose.

In several cases the reduction was thirty seconds less at one-half hour which was almost within the limit of error. This occurred in six of thirty cases. In one of the six not any reduction was obtained after

9. Petersen, M. F., and Mills, C. A.: New Method for Accurately Determining Clotting Time of Blood, Arch. Int. Med. **32**:188 (Aug.) 1923.

10. Todd, J. C.: Clinical Diagnosis and Laboratory Methods, ed. 5, 1924, p. 247.

one-half hour, although a slight reduction had occurred after fifteen minutes.

5. The average reduction at one hour after a 2 drachm dose was one minute and thirty-six seconds.

6. The average reduction at one hour after a 4 drachm dose was one minute and no seconds.

We might note here that after a 4 drachm dose the reduction was thirty-six seconds less than after the 2 drachm dose.

7. The average reduction in one and one-half hours after a 2 drachm dose was thirty-four seconds only.

8. The average reduction at one-fourth hour after a 2 drachm dose was one minute and two seconds.

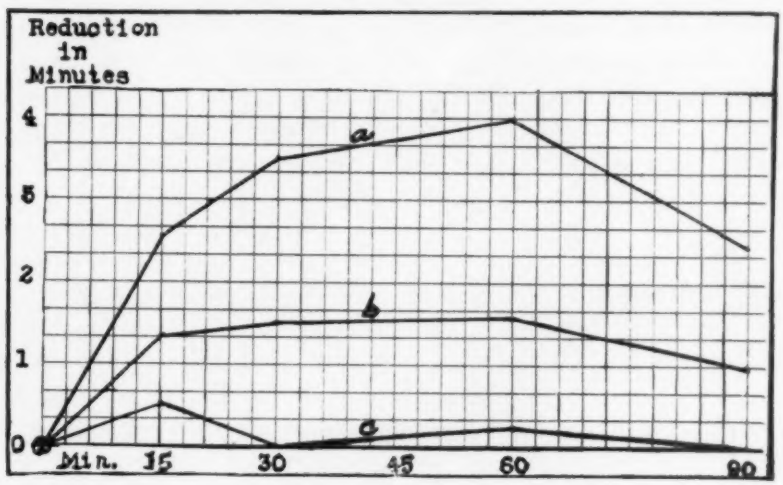

Chart 2.—*a* indicates the greatest reduction in coagulation time; *b*, the average reduction in coagulation time and *c*, the least reduction in coagulation time.

CONCLUSIONS

1. The alkaloids of *Ceanothus americanus* definitely reduce the coagulation time in the normal person. Our observations show this to be a reduction of about 20.5 per cent.

In this respect, our results differed from those of Groot [7] and Thoraldsen and Krawetz.[8] The former found the reduction to be 31 per cent when the capillary tube method was used, while the latter found it to be 41 per cent when the venipuncture method was used. All of their results were obtained with doses larger than those used in our series. We found that doses larger than those we used did not materially change the coagulation time in our group of cases.

2. The maximum effect seems to be obtained within one-half hour and to last through a period of one hour, after which a return to normal comes on rapidly.

3. The dose of 2 drachms gave a maximal effect; a larger dose did not materially depress the coagulation time to a greater extent.

4. Therapeutically, therefore, it would seem that the best advantages to be gained are by giving a dose of 2 drachms and repeating this hourly in order to produce a continual maximal effect.

5. While preparations of *Ceanothus americanus* do have the effect claimed for them, no one should expect to prevent or check hemorrhages by the use of this drug alone. It may be used as a possibly helpful adjuvant, but not to the extent of neglecting accepted precautions and, when hemorrhages do occur, adopting prompt and energetic surgical procedures.

1819 South Broad Street.
Hospital of the University of Pennsylvania.

IS MALNUTRITION PRIMARY OR SECONDARY TO EAR INVOLVEMENT WHEN THE TWO ARE ASSOCIATED?

T. H. ODENEAL, M.D.
BEVERLY, MASS.

At a meeting of the Medical Society of the Isthmian Canal Zone in January, 1922, I read a paper on "Otitis Media, Mastoiditis and Disease of the Nasal Accessory Sinuses as Causative Factor in Malnutrition in Children.[1]" This work included a report on seven cases in which a bilateral mastoidectomy was performed, with four deaths and three recoveries. The cases were collected entirely from the black race, and since the operations were purely experimental at that time, as I was the first to attempt this radical procedure and had no other results to guide me, they were performed only in the moribund cases on those placed on the list of the desperately ill with no hope of recovery.

The three recoveries were considered remarkable and totally unlooked for by the pediatric staff. Shortly after collecting these cases I resigned my position in the Canal Zone and located in Massachusetts, where the opportunities to further my research are limited. In fact, since this time I have encountered only two cases, in both of which the patients recovered after a bilateral mastoidectomy.

My attention was directed to these cases by Dr. Clark, a pathologist, a thorough man, who was accustomed to open the mastoids and sinuses in every body on which autopsy was performed, and who, in over 300 autopsies in case of malnutrition, found that 80 per cent contained pus in the mastoids and 50 per cent in the sinuses. Dr. Chapman, a pediatrician, was just as vitally interested, and therefore the three of us determined to experiment on a few of the patients who, it was felt certain, could not recover under the present mode of treatment.

The tissues over the mastoid were injected with epinephrine to prevent loss of blood, and the mastoid antrums were opened and kept open until drainage had ceased. The dressings took so much time and had such severe effects on the patient that a flap operation was performed in the later cases, as described by me in the ARCHIVES OF OTOLARYNGOLOGY.[2] The dressing was removed on the fourth day, without any further drainage being required afterward; healing took place in much less time, and

1. Odeneal: Ann. Otol. Rhin. & Laryng. **32**:561, 1923.
2. Odeneal: Modified Radical Mastoid Operation in the Treatment of Subacute Mastoiditis, Arch. Otolaryng. **3**:43, 1926.

the mortality was lowered. I am convinced that one of the patients was lost on account of lack of drainage due to exuberant granulations which form quickly in these cases; if the flap operation had been performed, this would not have happened. This procedure adds only five minutes to the time required to perform the operation and often eliminates the use of dressings for weeks. Simple cleansing of the canal suffices after the first dressing, with the instillation of mercurochrome-220 soluble, or better, neutral acriflavine. Chloroform anesthesia was employed, from 10 to 15 drops sufficing for the entire operation.

From the results obtained in these cases, we felt that the involvement of the mastoid was the primary cause and was not secondary to the malnutrition. When my article appeared, Dr. Dean of Iowa was kind enough to send me an article by Dr. Amy Daniels of the Iowa State University, who, by withholding vitamin A, had caused a suppurative sinusitis in rats. Mention was not made of the mastoids, but I do not doubt that if they had been opened, Dr. Daniels would have found pus in them as well. This and similar work has since convinced me that the malnutrition is the primary condition, and that lowering the patient's resistance allows infection of the sinuses and ears to take place. Then when the patient is placed on the correct diet, the presence of focal infection prevents assimilation of the nutriment, and death occurs. In those cases of malnutrition in which an added infection is not present, the patients do well, as a rule, as soon as they are placed on a proper diet. An excellent example of this fact is to be found in one of the cases I reported. The infant was admitted in an extreme state of malnutrition, but immediately began to improve on being placed on proper diet, until a few days before it was to be discharged, when suddenly without any rise in temperature, nausea, vomiting and diarrhea commenced. In the absence of an elevated temperature infection of the ear was not suspected until the infant, who was now seriously ill, suddenly presented a discharging ear; this was followed by an immediate cessation of vomiting and diarrhea.

In the typical cases of malnutrition the temperature is normal, subnormal or only slightly elevated. In this case, and this is only one of many, the involvement of the ear was primary, and the vomiting and diarrhea secondary to the infection, without a coincident rise in temperature which one is led to expect in primary involvement of the ear. except in tuberculosis.

In contradistinction to primary malnutrition, a type is also seen which is secondary in origin; this is due to infection by virulent strains of micro-organisms. As in cases of primary malnutrition, the ear drum may present little appearance of the actual condition behind it. The

majority of cases of secondary infection show acute inflammatory signs in the drum, whereas the majority of the primary type present only a dull, leaden appearance of the drum with slight thickening without bulging. The postsuperior meatal wall may sag or it may not. This sagging is often confused with bulging of the drum superiorly, which in infants lies on the same plane as the postsuperior wall of the canal.

The question in these cases is when to operate and when not to operate. Personally, I make it a rule in cases of infants and young children, to enter the antrum of the mastoid by an incision through the postsuperior meatal wall when a mastoid is suspected or when puncturing the drum does not suffice. This holds true in all my cases whether or not they are cases of malnutrition, and if the symptoms are not relieved, an external antrotomy is performed. Within the past few weeks, I have been enabled to save two young children from mastoidectomy by this means, both of them bilateral cases.

There has been a great deal of opposition to opening the mastoid in cases of malnutrition, and statements have been made by some of our most eminent aurists that this should not be done unless there is a definite condition of the ear; there cannot be any question that these men would never have operated in the cases which I did. The patients did not present enough evidence of an infection of the ear for opening the mastoid, and had I waited for such evidence, the few that I saved would not be alive. The children with this condition are never seen in the ear clinics; they are admitted into the children's hospitals, and it is never suspected that an infection of the ear exists. That is why some of the most skilled men say that such an infection is not present in cases of malnutrition; they never see the cases in their clinics, but if they would become associated with the children's hospital and follow the children with the pediatrician, they would soon become convinced.

The question is asked, Why do some of these patients have a rise in temperature while others do not, and why do some present a bulging drum while others do not? The answer may lie either in the virulency of the infection or in the patency of the eustachian tube. With a free tube, drainage could not be better, provided the middle ear does not offer obstacles; but if the tube is closed by adenoid tissue or swelling, the pus cannot get out and a bulging drum and a rise in temperature result. The question may now be asked why it is that there was no rise in temperature in the case that I reported. I believe the infection would never have been discovered and the infant would never have recovered if the eustachian tube had not become blocked and the middle ear ruptured after filling under pressure, but that the patient had had sufficient time to build up a resistance against the infection so that the temperature

did not become elevated, although the autonomic nervous system did become deranged and caused the gastro-intestinal symptoms.

Dr. Clark did not find evidence of disease or infection of the gastro-intestinal tract in any of the cases of malnutrition in which he performed the autopsy, which proves conclusively that the condition is one of derangement of the nervous system by the toxemia.

In those patients who do not respond well to antrotomy, there is unquestionably, in my opinion, an associated sinus disease, for which conservative treatment should be given first, and then if improvement does not result, more radical measures should be instituted.

THE VOICE IN SINGING AND IN SPEAKING

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Singing and speaking are closely associated, but they are different processes, and different training of the voice is necessary. They are two distinct mechanisms, but because they are carried on simultaneously, they have been erroneously considered as varieties of the same process. They differ in physiology, production and characteristics, both subjectively and objectively.

DIFFERENCES BETWEEN SINGING AND SPEAKING

Objective.—The objective differences between singing and speaking are found in the range, pitch, duration and quality of the voice. Singing is usually rapid and overlapping or slurred, but this is not necessarily true of speaking. In singing, the voice ranges over two octaves or more. In speaking, it rarely covers even one octave. Singing is at a sustained pitch, whereas in speaking the pitch varies, changes and is short in duration.

Subjective.—Sound depends on the proper functioning of four mechanisms—the motor, the vibrator, the resonators and the articulators. The motor is the lungs that supply the breath. The vibrator is the vocal cords, the activity of which give pitch. The resonators are the cavities in the throat and mouth, the accessory nasal sinuses in the head and the body as a whole, all of which give quality. The articulators are the lips, the tongue, the uvula, the soft palate and the lower jaw. By their various movements, the articulators form obstructions to the clear passage of the breath and thus produce speech. In singing, the articulators perform a minor office, but in speaking they are of paramount importance.

VOCALIZATION

When the breath is pumped from the lungs, it is set in vibration by the vocal cords as it passes them. This is called vocalization. The vocalized breath produced may now become a vocal note or a speech sound, depending on how it is controlled. The vocalized breath as it issues from the larynx is broken up into two streams in the upper portion of the throat. This is accomplished by the uvula and the soft palate. One of these streams passes up through the nasopharynx into the resonant cavities of the head and produces head resonance. The other stream issues in the mouth, where it strikes against the palate and produces palatal resonance. In addition, the lower stream is utilized for speech, whereas the upper one is used for resonance only and the production of the sounds *n*, *m* and *ng*.

VOWEL PRODUCTION

Speech is a function of the articulators, whereas pure sound is laryngeal in production. Singers who attempt to produce vowels by pure laryngeal exercise are practicing erroneously and harmfully. Though it is sometimes claimed that the vowel sounds are produced in the larynx, this is not true. The articulators are as important in the production of the vowels as they are in the production of the consonants. To convince oneself of this, one needs only to try to hum a vowel or produce a vowel with the tongue held down. The only success will be in the case of a broad *A*, because the natural position for the production of this sound is a tongue flat in the middle.

TRAINING THE VOICE

As singing and speaking are different processes, different training of the voice is required. A knowledge of the rudiments of singing is beneficial to the public speaker, but the singer needs the same training plus more, for he speaks when he sings. Speaking when one is singing should be an unconscious process. As soon as a speaker thinks of his articulation he is apt to throw the voice back, stiffen the tongue, contract the pharynx, strain the larynx and produce a husky or dead sound.

PHYSIOLOGY OF THE VOICE

In order properly to control articulation, it is necessary that the singer possess a knowledge of the physiology of the voice mechanism. The organs of speech are the lips, uvula, tongue, gums, palate and lower jaw. The first three participate actively, while the last three perform their functions passively, and consequently are often overlooked.

The Teeth and the Gums.—Because of their firm attachment, the teeth play a passive, though important, rôle. Though the teeth themselves do not make active obstructive movements to the clear passage of the breath, their very presence is a hindrance to it. Absence of the teeth causes an unnecessary escape of air and defective pronunciation of the sounds *f* and *th*. These sounds require that the tongue or lips rest against the teeth, and, naturally, when the teeth are missing, this is impossible. In the pronunciation of *f*, the lower lip comes in contact with the upper teeth and in *th* the tongue comes in contact with them. A defective dental arch will therefore interfere with enunciation. The upper gum functions similarly to the teeth. A receding gum or physical abnormality of the jaw will interfere with the *t* sound.

The Soft Palate and Uvula.—The soft palate is of importance in singing, because its action is essential in the production of the *ah* sound. In conjunction with the uvula, it rises to close the nasopharyngeal space

for all sounds except the nasals *n*, *m* and *ng*. When paralysis, muscular weakness or velar insufficiency are present, the voice is dull and wooden. The two following exercises are directed to the muscular development of the velum:

1. With the mouth wide open, say *ah-ah*, and watch the palate and uvula rise.
2. Yawn and watch the palate and uvula rise.

Direct stimulation of the soft palate and uvula by digital massage or use of the palatomasseur with a mild faradic current may also be used to advantage.

The Lower Jaw.—If the jaw projects too much, as in prognathism, the lips cannot approximate for production of the sounds *f*, *v*, *p*, *b* and *m*. Difficulty may also be had with the *s* sound. On the other hand, when the lower jaw is too short and receding, the *s* sound is too prominent and even a *t* may sound like an *s*, and the *s* sound itself may be produced as *sh*. Such cases need the attention of the orthodontist.

The Lips.—The production of the sounds *s*, *n*, *t*, *f* and *v* require the raising of the upper lip. The following exercises have been devised to obtain free movement of the lips:

1. Protrude the lips in a puckered position.
2. Raise the upper lip, exposing the teeth.
3. Wrinkle the nose so as to expose the upper lip.
4. Raise the right side of the upper lip.
5. Raise the left side of the upper lip.
6. Smile so as to stretch both lips.
7. Laugh so as to stretch both lips.
8. Pull down the lower lip, exposing the lower teeth.

The Tongue.—The tongue is the bugaboo of the singer. It gives more trouble than all the other articulatory organs combined. Without a full control of the tongue, no one can hope ever to become an accomplished singer. Not only is it important to know how to use it, but it is equally important to know how not to use it. The practice of the following exercises will give the singer good control of this organ:

1. Push the tongue out of the mouth as far as possible and downward toward the chin.
2. Push the tongue out of the mouth as far as possible and upward toward the nose, even touching the nose.
3. Point the tip of the tongue upward and downward alternately for a count of ten.
4. Rotate the tongue to the right, then down, then to the left, then up. Repeat ten times.
5. Protrude the tongue, grooving it at the same time by raising both sides.

6. Curl the tip of the tongue back of the front upper teeth with the mouth wide open. Repeat ten times.

7. Press the tip of the tongue back of the front lower teeth. Press and relax for ten times.

8. Let the tongue lie flat on the floor of the mouth, with special care that the front, middle or back are not elevated.

365 West End Avenue.

Clinical Notes

SUBMUCOUS RESECTION OF THE NASAL SEPTUM FOLLOWED BY COMPLICATIONS OF ACUTE OTITIS, MASTOIDITIS AND SINUS THROMBOSIS*

KARL MUSSER HOUSER, M.D.
PHILADELPHIA

Submucous resection of the nasal septum is never considered by the conscientious and cautious surgeon to be devoid of risk or fatal possibilities. Fortunately, serious complications following this operation are relatively uncommon. In the case reported in this article, such a troublesome and grave series of events occurred that it seems worth while to bring the case to the attention of the medical profession.

On May 2, 1927, I performed a submucous resection of the nasal septum on a young man. The patient, a fourth year medical student, was of good physique and habits. Nothing out of the ordinary occurred at the time of the operation, nor was there any evidence of acute or subacute infection of the nose or throat. Three days following this operation, acute lacunar tonsillitis, that fairly common sequel to nasal surgery, developed with its attendant symptoms of elevation in temperature, malaise and sore throat. Although there was much swelling of the nasal structures, which resulted in almost complete obstruction to nasal breathing, careful examination of the sinuses with transmitted light and the nasopharyngoscope did not reveal evidence of pathologic changes in the sinuses. On the following day, severe pain appeared in the right ear. This was due to an acute otitis with bulging of the tympanic membrane, for which a myringotomy was performed. A few drops of thin serosanguineous fluid escaped from the middle ear, and bleeding was profuse. At this time the blood count showed 9,600 leukocytes per cubic millimeter, and the results of a general examination were negative for the existence of disease in any other portion of the body. Profuse purulent drainage was established from this ear in about twenty-four hours. On the sixth day, dull pain was noted on the opposite side. The left tympanic membrane was inflamed, but bulging was not detected. Palliative measures were used, and spontaneous perforation occurred during the night; this was followed by profuse purulent drainage. Cultures of the discharge showed that both sides were infected with hemolytic streptococci; in addition, the left ear contained a hemolytic staphylococcus. At this time there were 80 per cent neutrophils in a total leukocyte count of 15,200.

Following this spontaneous perforation, a profuse discharge occurred from the left as well as from the right ear, and the patient was somewhat improved. Although pain was still present, it was not severe and the temperature continued to fluctuate between 99 and 101 F. On the eleventh day of the disease, four days after the spontaneous perforation, both tympanic membranes were incised with the patient under gas anesthesia. At this time, there was

* From the Department of Otolaryngology of the University of Pennsylvania.

so much swelling of the walls of the canal that the membranes could be visualized only in part. This swelling was peripheral and seemed to be neither definitely anterior nor posterior. Decided improvement followed the myringotomies; in two days, the temperature fell to normal and remained normal or subnormal for two weeks. During this interval, roentgenograms of the mastoid and sinus were taken. The report concerning the former read as follows: "Bilateral mastoiditis with clouding of all cells, more on the left. The cell walls seem to be intact." All sinuses were reported normal. A blood culture was also reported normal.

On May 16, two weeks after the operation, the patient was seen by Dr. George Fetterolf, who recorded the following observations: "Considerable bilateral pulsating discharge is present. Today a better view can be obtained of the right ear drum than at any previous time. The upper segment is concave and a titlike bulging is present in the lower portion, with an opening at the anterior inferior portion of the bulge. The left shows enough canal wall swelling to obscure the drum completely. On account of the general improvement, the low temperature, and the drop of leukocytes to 10,000, a waiting policy seems advisable."

Ten days later, the patient had so improved that plans were being made for his discharge. Both ears still showed some pulsating discharge, but in quantity it was greatly reduced. In addition, the pain had disappeared, and the general condition was decidedly better. Shortly after this, a throbbing pain in the left side of the head began to be troublesome. It was so constant and intense that sleep was gained only with the aid of narcotics. The temperature again ascended and fluctuated between 101 and 103 F. The leukocyte count was 15,500 with 76 per cent neutrophils. Vomiting also occurred for the first time and was so troublesome that it was difficult to have the patient retain any nurishment. Results of an examination of the eyegrounds were negative for any evidence of increased intracranial pressure.

The left mastoid was now operated on by Dr. Fetterolf and me. At this operation, subperiostral pus or edema of this region was not found. The cortex was hard and apparently not diseased. Pus was found in the antrum of the mastoid and cells adjacent to this space, together with some destruction of the cell walls. The tip of the mastoid, too, showed pus and destruction of the cell wall, but the cells between the tip and the antrum did not seem to be affected. The sinus plate was thoroughly exposed, but it was so healthy in appearance that it was decided not to expose the vein.

This operation was not followed by much improvement. A chill occurred during the night; the temperature continued to remain elevated, vomiting persisted, headache of a throbbing nature was still intense over the left side of the head, and a blood culture taken on the day of the mastoidectomy showed a pure culture of hemolytic streptococci. As soon as this was discovered, the patient was given a transfusion of 300 cc. of citrated human blood which had previously been subjected to careful cross-agglutination. Dr. Selling Brill continued to give similar transfusions on alternate days until six transfusions in all had been given. The amounts of blood used at each transfusion varied from 300 to 360 cc.

On the same day that it was discovered that the blood culture was positive, Dr. W. J. Gardner performed the Ayer-Toby test. The spinal fluid showed some elevation in pressure, reading 20 cm. of water. On compression of the left jugular vein, a change was not noted in the height of the water column of the spinal fluid manometer. Compression of the right jugular

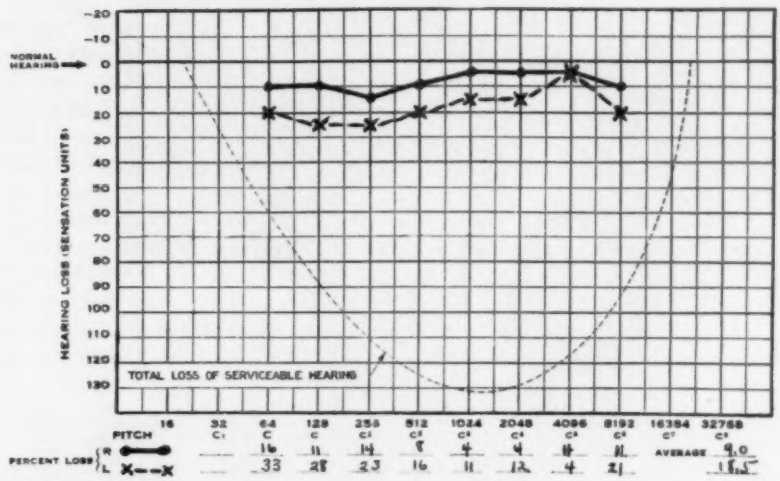

Chart 1.—Audiogram representing curve of hearing at the time of the patient's discharge from the hospital.

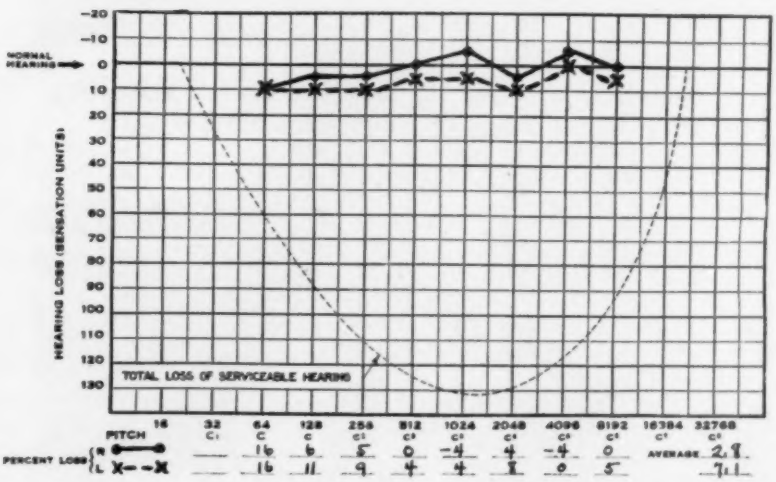

Chart 2.—Audiogram representing curve of hearing five months later.

vein, however, resulted in a rise of 14 cm. of water. Because of this observation, it was assumed that complete thrombosis of the left sigmoid sinus had occurred, and that operation should be performed.

Dr. George P. Müller ligated the left internal jugular vein; this was followed by operation on the sinus itself by Dr. George Fetterolf and me. When the sinus plate was removed, the exposed sinus had a gray, unhealthy color. Pulsation was not detected on palpation, and it did not have the soft resilience of the normal blood filled sinus. When this vessel was opened, about 3 cc. of yellow pus, under pressure, escaped. After sufficient removal of blood clot to secure free bleeding from the cranial end of the sinus, the vessel was lightly packed with a tape soaked in mercurochrome-220 soluble, and the mastoid wound was dressed with packing soaked in mercurochrome. Convalescence was uneventful from this time and the patient was discharged from the hospital on July 9.

An audiogram taken on June 30 gave the curve illustrated in chart 1 with a loss in hearing of 9 per cent on the right side and of 18.5 per cent on the left. An audiogram on Nov. 11, 1927 (chart 2), showed normal hearing on both sides, the hearing in the left ear being slightly less acute than that in the right. Since leaving the hospital, this patient has gained from 20 to 25 pounds (9 to 11.3 Kg.) and has apparently entirely recovered from his serious illness.

This case might be used as an object lesson of what medical cooperation can accomplish. Too much credit cannot be given to the internists who daily watched for evidence of complications, to the surgeon who ligated the jugular vein and gave transfusions every forty-eight hours as long as indicated, to the laboratory for its valuable data obtained by roentgen-ray and studies of the blood, and to the physicians on the neurosurgical service who contributed enormously in a carefully regulated Ayer-Toby test.

1826 Pine Street.

TRACHEOSCOPE AND BRONCHOSCOPES FOR USE WITHOUT A LARYNGOSCOPE*

M. C. Myerson, M.D., New York
Associate Laryngologist, Mt. Sinai Hospital

The tracheoscope that I shall describe was designed because all the available ones were too short. The tracheoscopes are so short that when introduced through the laryngoscope they are retained in place with considerable difficulty while the laryngoscope is being withdrawn. Therefore, a longer tracheoscope was designed to overcome this difficulty. It was at first intended that the tracheoscope should be used with the aid of a Jackson or a Mosher laryngoscope, but because of the ease with which the instrument was regularly passed through the anesthetized larynx without a laryngoscope it was decided to dispense with the laryngoscope. Because of the facility with which the tracheoscope could be passed in this manner, a 5 mm. and a 7 mm. bronchoscope were also made.

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* Read before the American Laryngological, Rhinological and Otological Society, Atlantic City, N. J., May 29, 1927.

Fig. 1.—Appearance of tracheoscope and upper esophagoscope.

Fig. 2.—Appearance of 5 mm. bronchoscope.

Fig. 3.—Appearance of 7 mm. bronchoscope.

The tracheoscope is 30 cm. long and has a full lumen of 10 mm. It is made of heavier material than the tubes of Jackson or Lynah. Its distal end is square cut. This feature has made the instrument valuable in upper esophagoscopy. Because of its round lumen and its size and ease of manipulation, it has replaced the other instruments used for the same purpose in my work.

The bronchoscopes are 5 and 7 mm. in diameter; they are of the full lumen type and have a suction channel in the wall of the tube. This channel can be used for oxygen insufflation so that a separate oxygen tube is unnecessary. They are made of heavy brass tubing, and the handles are heavy. The handles are somewhat lighter than those of the laryngoscopes and are of the same form. The illumination is obtained by means of light carriers of the same type as those used in the Jackson instruments.

In almost all of the bronchoscopies that I have performed during the past eight months, I have used these tubes. Difficulty has not been encountered because of the elimination of the laryngoscope.

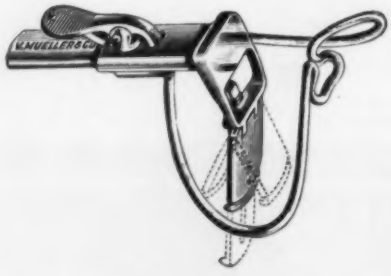
The tubes now being sold have a much smaller handle than those demonstrated. It was found that a lighter handle makes a better balanced instrument.

30 East Fortieth Street.

AN ADJUSTABLE MOUTHGAG TONGUE DEPRESSOR

EUGENE R. LEWIS, M.D., LOS ANGELES

I have combined certain elements of Sewall's and Whitehead's mouthgags in what seemed a more advantageous arrangement and have utilized it in over 5,000 cases with satisfaction.



Adjustable tongue depressor.

The jaws may be held at a desired degree of opening, and the tongue depressor is adjustable both as to extension and degree of depression. The instrument was made up originally at V. Mueller's in Chicago in 1913, and has never broken down or been out of order.

1154 Roosevelt Building.

Progress in Otolaryngology

A Summary of the Bibliographic Material Available in the Field of Otolaryngology

CHRONIC PROGRESSIVE DEAFNESS

INCLUDING OTOSCLEROSIS AND PATHOLOGY OF THE INNER EAR

J. K. M. DICKIE, M.D.
OTTAWA, ONT.

Kopetzky [1] recently published in the ARCHIVES some further studies on progressive deafness, in which he stated his conviction that otosclerosis as a distinct entity does not exist, and that in most instances it is a local manifestation of a general disorder. He classified his cases according to the audiometric curves, of which there were four types, namely, (1) a straight line, (2) a diagonal line running up to the right, (3) a diagonal line running down to the right and (4) a curve with a dip downward at both ends.

In the last group, in which there was a hearing defect at both ends of the scale, 88 per cent of the patients stated that their deafness was progressive. A definite history of deafness in blood relatives was given by 60 per cent. Increased bone conduction was present in 100 per cent of these patients, and there was a raised lower tone limit in 100 per cent. An internist examined 40 per cent of the patients and found metabolic disturbances in all. Of these, 100 per cent showed disturbed calcium metabolism, 84 per cent decreased blood calcium and 16 per cent increased blood calcium. An increase in uric acid in the blood was observed in 76 per cent. In this respect Kopetzky's results differ from those of Berberich and other observers, who found in general a diminution of uric acid in the blood.

In some of the other groups with different audiometric curves, similar results were obtained with the functional tests and general examination, and it is evident that in progressive deafness there is no one audiometric curve which is typical.

With regard to the patients in whom metabolic disturbances were found, the underlying conditions were varied, and included chronic nephritis, diabetes (20 per cent), menstrual disorders, gouty diathesis, vasomoter disturbances and intestinal intoxication.

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1. Kopetzky, S. J.: Nature of Progressive Deafness: Further Studies, Arch. Otolaryng. **5**:404 (May) 1927.

McKenzie [2] contributed an interesting paper on progressive middle ear deafness based on a study of 748 cases from his private practice. They were selected on the basis of the degree of the deafness and the fact that it was progressive. The cases were all of such a degree of severity that the voice could be heard at a distance of only 10 feet or less, and the deafness in all cases was stated to be progressive. They were divided as follows: chronic catarrh, 288; residual cicatrization, 80; active suppuration, 13; otosclerosis, 206, and mixed or combined types, 38.

In all groups there was a decided preponderance of females over males.

From a study of the history of the onset of the first symptom, it was found that tinnitus generally preceded the deafness by months and sometimes by years. The age of onset was given in 150 of the catarrhal cases, the average being 32 years. The age was given in 122 of the cases of otosclerosis. The average age of onset was 26; the oldest patient was 60, while in nine cases the time of onset was given as "childhood."

The tuning fork tests on the whole agreed with the classic conception with some minor variations. For the Rinne, Schwabach and Weber tests the 256 double vibration tuning fork was used. In the catarrhal group, bone conduction was increased in 291 ears, unchanged in 80 and diminished in 160. In patients with residual suppuration 88 showed increased, 16 unchanged and 50 decreased bone conduction. Of the otosclerotic ears 224 showed increased, 53 normal and 86 diminished bone conduction. The author remarks incidentally that many otosclerotic patients in whom the signs were those of pure nerve deafness must have been omitted. The figures showed up a surprising proportion of cases of diminished bone conduction in patients with catarrh and residual suppuration. As a matter of fact, taking the whole four groups together, three of eight patients with progressive middle ear deafness showed diminished bone conduction. The Rinne test was negative in all cases.

Recently the author tested bone conduction with low forks and found that it was diminished in fifteen of seventeen patients with otosclerosis, while with the middle forks it was increased.

The upper tone limit was reduced in seventy-four ears, in six with residual suppuration, in three with active suppuration and in eighty with otosclerosis. Similarly, the upper tone limit was lowered although the bone conduction was increased in thirty-four catarrhal ears, in two with residual suppuration, in one with active suppuration and in thirty-eight with otosclerosis. That is, in both these groups otosclerosis showed the greatest number.

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2. McKenzie, Dan: J. Laryng. & Otol. **42**:801 (Dec.) 1927.

Nothing new was observed in the physical examinations of these patients, except that 6 cases of exostosis of the meatus were found in the 206 patients with otosclerosis.

Scott-Williamson and Richards [3] presented a preliminary study of chronic middle ear deafness. Fifty-one cases were studied, and a full examination was made of each system, cardiac, respiratory, digestive, urinary, neuromuscular, genital and hematopoietic. In addition to these studies a sugar tolerance test and various renal and vital capacity tests were carried out. Seven patients showed signs of established diseases: of the heart (three cases), hyperthyroidism (three cases) and tuberculosis (one case). If these seven cases were excluded, the remaining forty-four were all within normal limits, according to the special tests, with the exception of the cardiorespiratory balance. Of the negative facts elicited it is significant that there was no special tendency to nasal catarrh or tonsillitis. Forty of the fifty-one cases occurred between the ages of 18 and 30, and the most frequent incidence was at the age of 22. From the study of the histories it was evident that the deafness began in most cases more than ten years previously, i.e., during school life. In all cases, also, the patient had a small delicate nose with collapsed alae. Tachycardia was another common sign. The authors concluded that deafness with nervous tachycardia had its onset in childhood and was not due to local sepsis or other demonstrable disease. The analysis of hearing was undertaken by Richards who found that all except one patient complained of tinnitus. The cases were divided into two groups: (1) those with a healthy nose, nasopharynx and pharynx, and (2) those with nasopharyngeal inflammation. The tympanic membrane in most cases showed little change. The functional tests brought out that in group 1 the deafness was of a high degree, with a contraction of the upper and lower tone limits. The Rinne reaction was negative in all the patients in group 1, but not so constantly in those in group 2.

D. W. Drury [4] reported a series of cases in patients who showed thyroid hypofunction in ear disorders. He divided them into four classes. In the first class were patients showing tinnitus, vertigo and a more or less marked sense of fatigue. The basal metabolic rate was about —20 per cent with a subnormal temperature and low blood pressure. There was an eosinophilia and lymphocytosis. Indican and the residual nitrogen fraction were increased in the urine. A diagnosis of thyroid insufficiency was made and thyroid gland was administered with considerable benefit. In the second group were patients showing repeated colds, reinfections, headaches and definite neuralgias. Drury

3. Scott-Williamson, G., and Richards, Horace: J. Laryng. & Otol. **42**:793 (Dec.) 1927.

4. Drury, D. W.: J. Laryng. & Otol. **42**:375 (June) 1927.

cited the case of a woman who had for many years been subject to colds without any apparent cause. Her nasal mucous membrane was continuously swollen, and she suffered from obstruction of the eustachian tube at times. She was habitually constipated and had attacks of indigestion. A diagnosis was made on a basal metabolic rate of —20 per cent, with a subnormal temperature and a pulse rate of 68. The blood showed lymphocytosis and an eosinophilia of 5 per cent, and indican was much increased in the urine. Thyroid therapy produced marked improvement. In the third group a patient is described who presented intermittent deafness, arthritis, psychic changes and neurasthenia. The fatigue was marked, and it interfered considerably with his business activities. The diagnosis was made on substantially the same grounds as in the preceding cases. In the fourth group there was a patient with stubborn eczema of the auditory canals, intermittent deafness and vasomotor disturbances.

In his summary the author pointed out that hypofunction of the thyroid in a mild degree is much commoner than is generally supposed, and that many cases of neurasthenia are really gland deficiencies. He emphasized in this article, as in previous publications, the necessity of accurate diagnosis, and stated that endocrine substitution therapy is specific. Thyroid medication will not help in pituitary cases, and vice versa.

Cleminson [5] reported a case of otosclerosis associated with blue sclerotics and osteogenesis imperfecta. The association of this triad has been recognized for a number of years, and numerous cases have been recorded in the literature. As a rule, these conditions show a marked hereditary tendency, with some members of a family having fragilitas ossium, others blue sclerotics and others all three conditions associated. Most of the patients examined otologically showed the clinical picture of otosclerosis. The occurrence of this association tends to strengthen the view that otosclerosis has a strong hereditary or constitutional basis.

The case reported was that of a woman, aged 23. She was of slender build and was one of a family of three, one of whom died in infancy. The surviving sister was of a much more robust build and was healthy. As far as can be made out "she is the only member of four generations of her family to exhibit the triad of symptoms, or even any one of them, with the possible exception of her father, a man of 53, who has been deaf since the war, but whom it has not been possible to examine." The patient gave a history of numerous fractures of various bones of the body. Deafness was noticed at the age of 13 and had been getting worse shortly before examination. There was no history of any inflammatory condition of the ear, and the onset and progress had been

5. Cleminson, F. J.: J. Laryng. & Otol. **42**:168 (March) 1927.

gradual. The ear drums were normal, but showed a reddish tinge shining through. The tuning fork tests elicited reactions typical of otosclerosis. The sclerotics were a pronounced grayish blue.

Shugrue, Rockwood and Anderson [6] also reported four cases of blue sclerotics, brittle bones and deafness. They remarked, as did Cleminson, that the condition is, as a rule, markedly hereditary, and that some members of the family have blue sclerotics, others have brittle bones and others may have all three. In the cases reported roentgenograms showed atrophy of the bones with considerable deformity from badly united fractures. One of the patients showed marked cardiovascular degeneration in addition to the triad. No further light was thrown on the metabolism of the inorganic salts in these cases, as the calcium and inorganic phosphorus were present in the blood in normal amounts.

In the fourth case the hereditary tendency was marked; approximately 50 per cent of the relatives showed the same triad of symptoms.

Gruenberg,[7] in examining the sections of a temporal bone in which there had been a tuberculous middle ear suppuration, found a small focus of otosclerosis in the promontory near the round window. The bony and membranous labyrinth did not show any inflammatory changes except a small erosion over the facial canal. An anomaly was found in another part of the labyrinth wall. The lumen of the semicircular canals was encroached on in places by bulgings of the wall, and this was most marked in the posterior canal. The author regarded these thickenings as congenital abnormalties. Mayer and others have also noted them and their relation to otosclerosis, another point in favor of the theory that otosclerosis is associated with a congenital defect.

At a meeting of the Berlin Otological Society, Doederlein [8] showed a series of sections from patients with otosclerosis in which he attempted to trace how an otosclerotic focus starts. He referred to Manasse's "mantle formation" of deeply staining new bone around the vessels, but believed that the appearances were due to old bone undergoing resorption by halisteresis, i.e., without the intervention of osteoclasts. He stated that in freshly diseased places one could see the bony lamellae run without interruption from healthy to diseased bone. Besides that, the bone cells of the diseased bone lay in as regular formation as those of healthy bone with their radiating branches, which could not be the case with new bone. In more advanced cases, all stages of degeneration were found until no more cells could be seen, and the bone became a horny, granular, structureless mass.

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6. Shugrue, J. J.; Rockwood, R., and Anderson, E. W.: Fragilitas Ossium and Deafness, Arch. Int. Med. **39**:98 (Jan.) 1927.

7. Gruenberg: Ztschr. f. Laryngol., Rhinol. **15**:78 (Nov.) 1926.

8. Doederlein: Zentralbl. f. Ohrenh. **27**:374, 1927.

In the subsequent discussion, Bruehl disagreed with Doederlein emphatically and thought that the appearances, as shown, were those of normal bone. The preparations, according to his view, proved nothing. How was one to know they were from patients with otosclerosis at all? His own preparations had been shown to a number of pathologists who all agreed that otosclerosis is a new bone formation. He thought one should not talk of otosclerosis unless there is clinical proof that the stapes is ankylosed. He held to the view that otosclerosis begins as a resorption of bone around the vessels through osteoclasts, followed by new formation through osteoblasts. He stated his belief that otosclerosis has nothing to do with osteomalacia and showed a series of slides to sustain his views.

Doederlein, in his reply, maintained his contention that bone absorption can take place without the help of osteoclasts by halisteresis, and that is how otosclerosis starts.

Simeoni,[9] in a short note on otosclerosis, gave a summary of some of the theories of its etiology, and proposed to undertake some studies on the parathyroid, and on pregnancy and heredity in its relationship to otosclerosis.

Leicher [10] contributed some curious facts relating to otosclerosis. He cited the work of a number of observers who found that blood and perspiration from menstruating women have a more toxic effect on cut flowers than those of women not menstruating. The urine, saliva and tears of menstruating women also have a toxic effect on plants and inhibit the growth of seedlings, yeasts and bacterial cultures, while similar materials from nonmenstruating women do not. These authors assumed that during menstruation some poison was present. Stern had undertaken similar investigations with otosclerotic patients and found that the serum in most cases had a slightly inhibiting effect on the growth of lupin seedlings. In continuation of this, Leicher, with better technic, carried out further studies and came to the following conclusion: The serum, whole blood and, to a certain extent, urine, saliva and sweat of otosclerotic patients show a much stronger poisonous effect on plant cells than do similar body fluids from healthy, nonmenstruating subjects. The poisonous effects showed themselves in an early death of cut flowers of equal age, and in an inhibiting influence on the fermentation of yeast. The poisonous effect is found also in extracts in alcohol, chloroform, ether and acetone, but is absent in dialysate. The phosphatides are most probably the carriers of the poison. Otosclerotic patients while menstruating show an increase of the poisonous effect on plants.

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9. Simeoni, Carlo: Arch. ital. di otol. **38**:10 (Oct.) 1927.
10. Leicher: Zentralbl. f. Ohrenh. **27**:4, 1927.

Barlow [11] reported the results of some experiments on rats to ascertain the relationship between rickets and deafness. The animals were fed on a ration deficient in vitamin D which produced well marked rickets within a few weeks. The animals were then killed, and the labyrinth capsules were dropped into a solution of silver nitrate, after which they were exposed to light and blackened. They were sectioned without decalcification, and the amount of calcium was estimated by the blackness of the staining. The results were negative in that the labyrinth capsules of rats with rickets showed just as much calcium as those of healthy rats, and that before they were killed the rats did not show any evidence of deafness.

Zisenis [12] contributed an article on the occurrence of fatty material in the drumhead. His paper was based on fifty tympanic membranes obtained at autopsies from bodies of varying age and sex. Fatty material was found in thirty-five of the fifty drumheads. There was generally a thin layer of cerumen on the surface of the drum which stained with sudan. The areas in which the greatest amount was found were in the circular fibers near the periphery and also at the attachment of the handle of the malleus. It was distributed for the most part as tiny intracellular granules, but here and there a large fat cell was seen near the edge of the membrane. Fat was not found in the pars flaccida.

Some fat was seen in drums of all patients over 16 years of age, but not to any great extent until after the age of 60. From the age of 40 onward there was a steady increase in the amount of fat, beginning at the periphery. From 60 onward it was regularly found also near the malleus.

After going into the factors which increase the fat content of the blood, the author agreed with Berberich that the arcus lipoides myringis is due to hypercholesterinemia.

PARACUSIS

Shambaugh [13] recently contributed a study of paracusis willisii in the ARCHIVES and reported a series of experiments carried out with the audiometer in a railway train on normal ears and on those of patients with paracusis. He concluded that in the presence of a noise normal hearing is impaired. This impairment is greatest for the low tones. A defect in hearing which is the result of stapes fixation is not improved in the presence of extraneous sounds. The hearing, on the contrary, is diminished. The improvement in hearing in paracusis is only apparent

11. Barlow: Laryngoscope **37**:640 (Sept.) 1927.

12. Zisenis, K.: Arch. f. Ohren-, Nasen- u. Kehlkopfh. **116**:96 (Dec.) 1926.

13. Shambaugh, G. E.: Explanation for Symptom of Paracusis Willisi: Demonstration, Arch. Otolaryng. **6**:228 (Sept.) 1927.

and is caused by the raising of the voice to overcome the surrounding noise; as the deaf person is not disturbed by the noises to the same degree as the normal person, he hears the voice better.

TINNITUS AURIUM

Sturm [14] wrote on the beneficial effect of the local application of atropine in tinnitus. Several years ago he noted that in a number of cases of tinnitus associated with various conditions of the ear atropine applied to the middle ear through a perforation or by a catheter would cause the noises either to diminish or to disappear. Liquor atropinae is used in cases in which there are perforations or through the eustachian catheter, while a solution of atropine sulphate, grains 5 (0.32 Gm.), dissolved in alcohol and made up to 1 ounce (30 cc.) in aniline oil is used on the intact drum. As the author said, "the cases are few, the successes rarer than failures," but they are worth recording, and a number of case records were given. At the same time, he pointed out the rarity of tinnitus in children and the fact that the aqueduct of the vestibule is much larger in the child than in the adult. He argued, therefore, that tinnitus may be due to interference with the mobility of the stapes in a person with narrow aqueducts, causing a rise in the intralabyrinthine pressure. Another possibility is that the secretion of endolymph may be controlled by the efferent fibers of the eighth nerve and that it may be influenced reflexly by impulses from the tympanic mucous membrane. If this were true the influence of atropine on tinnitus might be explained.

TREATMENT OF DEAFNESS

Wodak [15] of Prague gave further details of his arsenic treatment of deafness. The number of patients treated exceeded 300, and good results were claimed. The method was as follows: One pill of 5 mg. of sodium arsenate is taken with the evening meal and the patient's reaction to it is watched. If unfavorable effects are not observed two doses are given the next day, and three on the third day. In the less severe cases this dosage suffices, and it is continued until from forty to sixty pills, or from 200 to 300 mg. of arsenic, have been taken. If intestinal troubles appear, the treatment is stopped altogether until the symptoms have completely disappeared; then it is slowly started again with 5 mg. doses. After the required amount has been taken, the treatment is stopped gradually, and the patient is given a complete rest of from three to four months to allow time for the system to rid itself of the arsenic.

Persons with various forms of deafness may be treated in this way. Fifty-six patients with otosclerosis were treated, with failure resulting

14. Sturm, F. P.: J. Laryng. & Otol. **42**:449 (July) 1927.
15. Wodak: Laryngoscope **37**:894 (Dec.) 1927.

in twenty-two and success in thirty-four cases. The hearing improved from 100 per cent to thirty times the hearing distance. In seventy-four patients with chronic middle ear catarrh and adhesive process there was no change in twenty-four and improvement in fifty. There were twenty-four cases of neuritis cochlearis in which success was obtained in 58.5 per cent. Altogether of 213 ears, 62 per cent were successfully treated.

The mode of action of the drug is not known.

Stevenson and Wilson [16] reported on the treatment of middle ear deafness by radium. Radium was said to have a loosening effect on old scar tissue and to arrest inflammatory changes. The authors treated eight patients with progressive deafness, of whom three had otosclerosis and five chronic middle ear catarrh. They used radium emanation in capillary tubes and applied it for twenty-four hours. This was followed about eight days later by a radium reaction. Inflation by catheter was then carried out three times weekly. They claimed to have obtained improvement in nearly all of the cases.

TREATMENT OF DEAFNESS FROM EUSTACHIAN OBSTRUCTION

Oaks and Merrill [17] in chronic progressive middle ear deafness advocated the systematic use of the eustachian bougie for long periods after removal of the tonsils, the performing of a submucous resection, etc. The use of the bougie is continued for about a year. Some slight improvement was claimed.

Another article appeared within the last year, in which great improvement in hearing was claimed from treatment of the eustachian tube. Coelst [18] believed that 90 per cent of cases of deafness are due to obstruction of the eustachian tube. He treated the obstruction by surgical diathermy through a vulcanite catheter. The bougie is of spring steel with a small button of solder on the tip. The site and extent of the obstruction is previously determined by the use of a bougie. With the steel bougie in position a current of 350 milliamperes is slowly turned on and continued for three seconds. The bougie is slowly withdrawn and the current turned down. Coelst claimed that the resulting scar tissue is much more flexible than ordinary scar tissue. The patients during the subsequent two or three weeks are much deafer from the resulting reaction. Fifteen patients were treated, in thirteen of whom the patency of the tube was restored. In eleven the hearing was markedly improved, and in none was it made worse. Seven of the patients were seen after six months and the improvement was confirmed.

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16. Stevenson, W. C., and Wilson, T. G.: J. Laryng. & Otol. **42**:96 (Feb.) 1927.

17. Oaks, L. W., and Merrill, H. G.: Laryngoscope **37**:190 (March) 1927.

18. Coelst, Maurice: Bruxelles-méd. **7**:1115 (July 3) 1927.

[To the abstracter this would appear a somewhat risky procedure when one considers that in normal ears the carotid artery lies just below the narrowest part of the tube and is separated from it by a layer of bone as thin as paper, while immediately above is the dura mater of the middle fossa separated from the tube by a layer of bone at least as thin, and in many instances actually dehiscent.]

Nesfield [19] devised an operation for the alleviation of deafness. The author, by the way, is not an otologist. Several years ago while in the Indian Medical Service he thought of an operation to overcome occlusion of the eustachian tube. The operation is essentially similar to that of Charles Heath, in that the antrum is opened and the posterior wall of the bony meatus is removed. A flap similar to Koerner's meatal flap is cut, and the meatus is kept open by a tube and later by packing. More than 200 patients were operated on at the ages of from 4 to 70 years. The results were variable, many patients showing great improvement. The improvement in hearing was not as a rule experienced until six months or a year later. Patients with otosclerosis were not improved.

DISEASES OF THE INNER EAR

Deafmutism.—Undritz [20] studied the temporal bones of an 18 year old deafmute who had died of otogenic sepsis. He found the most important changes in the pars inferior, while the pars superior had remained almost completely unaffected. In the cochlea changes were found in the membranous parts only and none in the bone. It was principally the epithelial structures, such as the cells of Corti's organ, which showed degeneration. The ductus cochlearis was collapsed. The changes described resembled Scheibe's type of congenital deafmutism. Taking into consideration, however, the appearances of inflammation, such as the presence of fibrin and infiltration of the nerve, it is possible that all the appearances of degeneration could be explained on an inflammatory basis, and the case might, therefore, be classed as acquired.

Uspenskaja [21] described three cases of deafmutism acquired after typhus, measles and cerebrospinal meningitis. Marked changes were found in the brain membranes, the ventral acoustic nucleus and the flocculus. The central vestibular nuclei were normal. In two patients in whom the deafness had come on in early childhood, changes were also found in the higher neurons. In the third patient in whom the deafness had come on in the twelfth year the changes did not extend above the first neuron. Such cases give an indication of the cause of deafmutism when the inner ears do not show any change. In cases in which clinically

19. Nesfield, Vincent: Lancet **2**:1333 (Dec. 24) 1927.
20. Undritz, W.: Zentralbl. f. Ohrenh. **28**:1, 1927.
21. Uspenskaja, V.: Ztschr. f. Hals-, Nasen- u. Ohrenh. **9**:4, 1925.

symptoms are not found in either the middle ear or the inner ear and yet deafness occurs suddenly during an infectious disease, lumbar puncture is indicated.

Labyrinthitis.—Turner and Fraser [22] published the first part of a study of labyrinthitis based on the cases seen in the past nineteen years in their service in the Royal Infirmary, Edinburgh. There were 150 cases in all, and they occurred in a proportion of 1.4 per cent of the total number of cases of suppuration of the middle ear. Twenty-one occurred as a complication of acute suppuration of the middle ear, and 129 as a complication of chronic suppuration of the middle ear, or 0.7 and 1.4 per cent, respectively. With regard to age, more than two-thirds occurred in the first four decades, with the largest number in the decade from 10 to 19 years. This parallels closely the age incidence in chronic suppuration of the middle ear.

The types of labyrinthitis were as follows: circumscribed, 30 per cent; acute serous, 2 per cent; acute purulent, 16 per cent; chronic purulent, 40 per cent, and spontaneous cure of labyrinthitis with loss of function, 10 per cent.

Commenting on the etiology they stated: "We are unable to furnish from our case records any evidence, either clinical or bacteriological, to show that a particular disease or variety of organism infecting the middle ear, is more prone than another to set up a secondary labyrinth infection."

With reference to the relation between the duration of the ear discharge and the onset of the labyrinthitis in the acute and subacute cases the history was definite in sixteen. The period varied from two days to three months, with the average between the third and fourth week. In the chronic cases the average was eleven years.

Cholesteatoma was found in 63 per cent of the chronic suppurative cases, in which exact data were noted. It was present in 70 per cent of forty-four chronic cases with circumscribed labyrinthitis, and in 69 per cent of thirteen cases of acute purulent labyrinthitis. It was present in 58 per cent of fifty cases of chronic purulent labyrinthitis in which its presence or absence was known. It was present in 60 per cent of the cases in which healing occurred.

Facial paralysis was noted in 8 per cent of the patients. In tuberculosis of the middle ear, on the other hand, facial paralysis occurred in 45 per cent of one series of cases and in 39 per cent in a second series.

Erosions and fistulas were found in a large number of the cases, while more than one lesion of the capsule was found in six instances. A fistula or an erosion of the lateral semicircular canal was by far the com-

22. Turner, A. L., and Fraser, J. S.: J. Laryng. & Otol. **42**:22 (Jan.) 1927.

monest lesion, while in a few an open oval window was seen. In the latter class, the authors point out that it is possible that the lesion may have been caused by a labyrinthitis bursting through into the middle ear.

The clinical symptoms are described in detail by the authors, but they do not come within the scope of this abstract.

OCCUPATIONAL DEAFNESS

According to Sacher [23] damage by noise constitutes the most important occupational disease of the ear. In 450 boilermakers, normal hearing was found in only 21.6 per cent. In those of ages up to 29, almost 50 per cent of the workers were deafened, while in those aged from 30 to 40 years more than 80 per cent were deafened, and of those over 50 years of age all were affected. Even working periods of from some months to one year produced some deafness in 22.2 per cent of the men. After nine years of work the proportion rose to 93 per cent, and after thirty years to 100 per cent. Bone conduction was shortened in all patients examined. The deafness was localized to the inner ear alone in 82.7 per cent of the cases. The loss of hearing was much more marked for whisper than for ordinary voice. At the beginning of the condition, the first objective symptoms were shortening of the air conduction for C^5. Tinnitus was observed in 56 per cent of the workers and some giddiness in 45 per cent. Plugging of the ears is not any protection and interruption of the work for long periods does not have beneficial results.

The same author in another article [24] commented on the effects of lead poisoning on the ear in lead workers. It is characteristic of disease of the ear in lead poisoning that the ramus cochlerais is the only thing affected. Poisoning was found in 3 per cent of the workers who had been in contact with lead for a considerable time. The loss of hearing was marked and varied in degree between 50 and 75 per cent, but never went on to total deafness. Tuning fork tests showed that the condition was one of the inner ear, as bone conduction was shortened. The vestibular apparatus was unaffected in all patients examined.

TRAUMATIC LESIONS OF THE EAR

Kompanejetz [25] reported on the clinical effects of air contusion on the ear. Air contusion acts in several ways: through its psychic effect, through the intense sound, through variations in pressure of the outer air and through harmful gases. In his study of 150 patients, he found that 72 per cent complained of loss of consciousness, 76.6 per cent of subjective noises and 72.6 per cent of giddiness. Complete deafness or

23. Sacher: Monatschr. f. Ohrenh. **61**:337, 1927.
24. Sacher: Monatschr. f. Ohrenh. **61**:754, 1927.
25. Kompanejetz, S.: Zentralbl. f. Ohrenh. **28**:1, 1927.

deafness of over 1 meter for conversational speech occurred in 11.7 per cent. The Rinne reaction was more often positive than negative. The Schwabach reaction was normal in 1.3 per cent, lengthened in 0.7 per cent and shortened in 7.3 per cent. Loss of perception for the highest and the lowest tones was equally common. Spontaneous nystagmus was observed in 24.7 per cent. With the caloric test 76 per cent showed diminished activity, 21 per cent showed increased excitability and 3 per cent were normal. In a small proportion of cases there was no reaction to the caloric and rotation tests. The duration of the after-nystagmus was in most patients diminished. The galvanic reaction was also diminished in most cases and occasionally absent. From analogy with other organs and from animal experiments it is probable that hemorrhage had occurred into the endolymph.

Thielemann [26] gave the results of some experimental work on trauma of the inner ear at birth. In order to explain the occasional occurrence of hemorrhages in the inner ear of infants after prolonged labor, the author subjected new-born rabbits to experiments simulating the conditions of the human head during birth. Strong suction was applied to the head with cupping glasses to produce a swelling resembling the caput succedaneum of a baby. Some of the animals were killed at once—others after an interval of some months. Histologic preparations were made which demonstrated hemorrhages in the labyrinth or the results of hemorrhage.

He explained their occurrence as the result of disturbances in the venous circulation in the skull. Backward pressure occurs in the longitudinal, lateral and petrosal sinuses, and through these in the veins of the inner ear. Hemorrhages do not tend to occur in the middle ear, as the venous drainage is mainly toward the pterygoid plexus and to the plexus around the carotid artery.

TOXIC LABYRINTHITIS

Sturm [27] reported a case of toxic neurolabyrinthitis in a woman, aged 32, in whom attempts had been made to induce labor by means of quinine and castor oil. Three attempts had been made at intervals of a week. The dosage was not stated. After the first two doses, severe tinnitus and vertigo occurred which lasted for twenty-four hours. After the third dose, the tinnitus was more severe and has persisted ever since. It was aggravated during menstruation, at which time vertigo also occurred. Deafness was not present, and the only objective evidence was a slightly shortened bone conduction.

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26. Thielemann: Ztschr. f. Laryngol., Rhinol. **15**:126 (Feb.) 1927.
27. Sturm, P. P.: Lancet **2**:329, 1927.

PATHOLOGY

Aschoff and Fuld [28] reported on the observations at autopsies performed on 100 children who died of various diseases. The age varied from 2 weeks to 5 years. Four fifths of the children had otitis media, which, in the great majority, had not presented any clinical symptoms. By comparison, in 100 adults chosen at random, otitis media was only rarely found. In 77 per cent of all the patients with infantile otitis, pneumococci were found. In 16 per cent of the cases there had been a metastatic infection of the blood, meninges or peritoneum. In 3 per cent mastoiditis or some other local complication was present.

Keen [29] wrote on the ossicles in suppuraion of the middle ear, etc. His material was obtained from radical mastoid operations. In about half of his cases no malleus or incus could be found. In a number of cases, also, the ossicles were so fragile that they crumbled when an attempt was made to remove the granulations and soft parts from them. Caries of the malleus is most commonly found in the head on the side away from its articular surface. The tip of the handle of the malleus is also frequently affected. The long process of the incus in his specimens was frequently absent, and the body of the incus showed some caries in a few instances.

He made some comparison between the ossicles of the adult and those of the child. The size and shape are practically the same at all ages, the growth being apparently complete at birth.

Popoff [30] reported on the histology of twenty-two temporal bones from eleven patients with typhus exanthematosus. The most characteristic fact was the condition of the blood vessels, in which were found desquamative and proliferative, as well as destructive and thrombotic, changes, with great narrowing of the lumen of the vessel, followed later by widening. Hemorrhages were found in the middle ear, with acute catarrh and hyperemia of the mucous membrane, the periosteum and the bone. The changes in the blood vessels were found in both the endolymphatic and the perilymphatic spaces. The eighth nerve showed characteristic small nodules scattered along and among the nerve fibers, which produced degeneration by pressure, as well as by giving off toxins. Parenchymatous and interstitial changes were also present in the nerve.

Swerschewsky,[31] writing on the same subject, distinguished two forms of deafneses in typhus. The first occurs in 91 per cent of the patients, begins in the first days of the illness, reaches its maximum at

28. Aschoff, L., and Fuld, J.: Passow's Beitr., vol. 23, referred to in: Zentralbl. f. Ohrenh. **27**:7, 1927.

29. Keen, J. A.: J. Laryng. & Otol. **42**:174 (March) 1927.

30. Popoff: Zentralbl. f. Ohrenh. **28**:1, 1927.

31. Swerschewsky: Zentralbl. f. Ohrenh. **28**:1, 1927.

the crisis and clears up gradually but completely from four to six weeks later. The other form occurs after the end of the disease and remains stationary. It is much rarer than the other. The vestibular nerve was affected in about 58.8 per cent of the cases and was almost always accompanied by a disturbance of the cochlear nerve. The author regarded these lesions as primary in the inner ear and due to the typhus virus. Streptococcal disease of the middle ear occurred in a small percentage of his cases.

Abstracts from Current Literature

Ear

OTOSCLEROSIS. GEORGE J. JENKINS, J. Laryng. & Otol. **43**:1, 1928.

The author considers that there is a definite clinical and pathologic entity called otosclerosis, but that the causative pathologic process may be capable of producing a variety of symptoms and signs of extremely divergent character; furthermore, that other pathologic processes may produce the same symptoms and signs, with a similar divergence of character. In discussing the syndrome of otosclerosis, it was pointed out that the earliest symptoms may suggest an internal ear deafness, with loss of bone conduction. Other cases may be an admixture of signs of middle and internal ear deafness. The author further suggests that it is nearly always possible to demonstrate some degree of loss of bone conduction, especially of the low tones, even in the most characteristic types of deafness.

Many examples of the different types of deafness are given: middle ear, internal ear and mixed — all classed under the heading of otosclerosis. In several of these cases, roentgenograms of the internal ear were made by Dr. Graham Hodgson, who reported changes similar to those of otosclerosis. Many diseases other than otosclerosis produce similar symptoms and signs with the same extreme divergence of character.

Osteitis deformans, a general disease of the bone, which attacks the labyrinthine capsule from the outside, may also cause deafness which varies from a pure internal ear deafness to a pure middle ear deafness. The details of eight cases are given. The author believes that many cases of osteitis deformans are overlooked. It is possible for the two diseases, otosclerosis and osteitis deformans, to be concurrent. However, the author sectioned the temporal bones in three of the patients with osteitis deformans and was unable to find any changes in the bone suggestive of otosclerosis. Some degree of internal ear deafness may be found in cases of hyperostosis of the external auditory meatus. In the author's experience, a loss of bone conduction is almost constant in those cases. As the pathologic changes in the labyrinth peculiar to "progressive middle ear deafness" have not been definitely described, the author believes that the description of this condition should be omitted from the textbooks. He believes that many of the conditions formerly diagnosed as such were really cases of otosclerosis.

The "otosclerosis syndrome" is common in cases of osteogenesis imperfecta. In this disease osteoporosis and new bone formation are not observed. The bones are delicate but complete and well formed. Details of the examination of the ears are given in three cases. The author concludes that this disease does not of itself cause any type of deafness, but many of the patients are affected with otosclerosis. Mention is made of Professor Nager's sections of the temporal bones in a case of osteogenesis imperfecta with otosclerosis.

In discussing certain changes in the eustachian tube, middle ear, tympanic membrane and external auditory meatus, which have been regarded as characteristic of otosclerosis, the author regards these conditions rather as anatomic peculiarities associated with the disease than as results of the disease itself.

In commenting on the symptom of paracusis, the author does not believe that the bony changes in the foramen ovale are sufficient to account for the variability of this symptom. The occurrence of vestibular symptoms is more common when the two ears are unequally affected by the otosclerosis, and the suddenness of the attacks of vertigo suggest a cause other than the possible changes in the bone in the vicinity of the vestibular nerve endings, as the effects of the slowly progressing disease of the bone would probably be compensated for centrally.

OTOSCLEROSIS: ITS CLINICAL ASPECT. F. R. NAGER, J. Laryng. & Otol. **43**:15, 1928.

These observations are based on the examination of 835 patients. The incidence of otosclerosis in Nager's series is 20 per cent of all ear conditions in patients examined. Five hundred and seventy-four of the patients were females. The onset of the symptoms was most commonly between the ages of 20 and 30 years. In only 13.7 per cent of the cases did deafness manifest itself before the age of 16. A hereditary history was obtained in 58.6 per cent of the patients. The frequency of heredity is one of the main points given in support of the hypothesis that otosclerosis is a constitutional disease, but anomalies of the vegetative nervous system, chemical composition of the blood and the endocrine glandular function must also be considered.

The theory of the constitutional nature of otosclerosis is further supported by its frequency in both ears. In this series, it was unilateral in only 13.6 per cent of the patients. The author found that even after years, in some cases, the disease was still confined to one ear. Even with the most precise microscopic examination, the disease was found in only one ear. Ninety-five per cent of the patients complained of increasing deafness. The rate of progression differs greatly, a stationary period not infrequently occurring.

Tinnitus occurred in 68 per cent of the patients; vertigo was present in only 0.5 per cent; the ear drums were perfectly normal in 71 per cent and reddening of the promontory could be seen in only 20 per cent.

The author believes that the influence of pregnancy in otosclerosis has been exaggerated. Of the 547 female patients, 264 were unmarried. If child bearing is so deleterious there should be a greater proportion of married women. In 16.5 per cent of the patients pregnancy had not had a harmful effect, whereas in 46 per cent a change for the worse had been noted, but mostly after a number of births. It is obvious that great prudence should be exercised in giving advice as to the danger in pregnancy and confinement. Knowledge of the exact laws of heredity is not precise enough to influence the future and happiness of the patients. Hereditary tendencies were present in only 48 per cent of the patients.

The author bases his diagnosis of otosclerosis on the principles laid down by Bezold and Siebenmann (Bezold's triad).

OTOSCLEROSIS: ITS TREATMENT. ALBERT A. GRAY, J. Laryng. & Otol. **43**:21, 1928.

The author believes that the deafness of otosclerosis is due rather to the suspension of the function of the organ of hearing than to its actual destruction. The grounds for this belief are several. Bone conduction is often as good or better than normal. Some of the patients hear better in a noise (paracusis) than normal persons. In a large percentage of cases the hearing may be strikingly improved for a minute or two under certain circumstances. The author argues that if the deafness is due to ankylosis of the stapes, it could not momentarily be relieved by the inhalation of nitrite of amyl. He believes that such rapid physiologic changes could not take place in any structure other than the neurons concerned in the function of hearing. As the nerve impulse passes from the organ of Corti to the brain, it must pass through various synapses. It is in the synapses that resistance to transmission is greatest and that the neurons are weakest.

The neurons of the vasomotor system, which control the blood supply to the organ of hearing, are also much concerned in the function of hearing. The writer has suggested in a previous work that otosclerosis is a degenerative process involving the organ of hearing as a whole, and it is his present intention to further develop this view. At birth a person is supplied with all the neurons he will ever possess. Any further elaboration in development depends on changes in the individual neuron, not on their multiplication. At first, they are nonmedullated, and myelination only begins when the neuron commences to function, and it occurs later in proportion as the nerve fiber is more recent

in the phylogenetic history of the animal. Development of the neuron continues until the prime of life — between the ages of 30 and 40 years. The neurons then remain stationary for several years; retrogression begins with old age. If the neurons concerned in the function of hearing have not the same inherent vitality as other neurons, they would show retrogressive changes earlier in life. This may not be uncommon, because the organ of hearing is of comparatively recent origin in evolution. As the synapse is the weakest spot of the neuron, the changes first appear there. The nerve impulses can no longer pass freely through the synapses, with the result that functional activity of the organ of hearing is impaired. Consequently, it requires a greater stimulus at the periphery (the organ of Corti), to overcome the increased resistance. This explanation may also account for paracusis and tinnitus.

When the organ of hearing is called on to function, its blood supply must be increased, and this increase is regulated by the neurons of the vasomotor system. If these neurons are defective, the tissues concerned must suffer, and the hearing will be lessened. The author believes that the blood supply to the soft tissues would be sufficient to prevent any anatomic change. However, the effect on bony tissue would be harmful because there would be an impairment of the rapid cellular changes continually going on in bone. In the organ of hearing the most active bony region is in the anterior wall of the oval window, because here the movements of the stapes reach their greatest amplitude. It is exactly in this region that the bony changes in otosclerosis most often occur.

The author summarizes his belief that otosclerosis is a degenerative process resulting from an inherent defect in the neurons concerned in the function of hearing. This includes the neurons of the vasomotor system which regulate the blood supply of the organ, as well as those concerned in the transmission of nerve impulses from the organ of Corti to the brain.

TREATMENT

Local treatment is entirely disappointing. The most important element is concerned with treatment of the patient as to general condition. The author has found that otosclerosis frequently makes its appearance in young women when they are suffering from chlorosis. The evil effects of pregnancy are well known. Any septic focus in the body has a bad effect on the course of otosclerosis. Exhaustion has a deleterious effect on the disease. Patients themselves remark that when they are tired their hearing is worse. Tinnitis is much more severe after exhaustion. If the tinnitis is severe, recourse must be had to drugs. Barbital is more effective and not so depressing as the bromides. One large dose at bedtime is more effective than several small doses. The surgical treatment of otosclerosis has been rather unsatisfactory in the past. In conclusion, the author mentions that atrophic rhinitis may be explained on grounds similar to those given for the occurrence of otosclerosis, that is, an inherent defect in the neurons concerned. In atrophic rhinitis, there are the same diminished sensitiveness of the part, diminished secretion and failure of the vasomotor mechanism to respond to irritation. The age incidence of the two diseases is approximately the same; they are commoner in women, and there is a hereditary factor in both.

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REPORT ON FORTY-ONE CASES OF LABYRINTHINE MENINGITIS. GUETTICH, Ztschr. f. Hals-, Nasen- u. Ohrenh. **18**:183, 1927.

The author reports thirty-three cases of cholesteatoma and eight of acute suppurative otitis media. Eighteen were preoperative and eleven postoperative; the diagnosis in four was uncertain. The results were more favorable in the chronic cases. In six cases the condition was diagnosed as serous meningitis; at least the spinal fluid showed only mild alteration. All of the patients recovered after a one-stage operation. Seven were severely ill at the time of admission; following the one-stage operation, six recovered.

In nine cases, a two-stage operation or watchful waiting was employed; death occurred in seven cases. All these had signs of recent or subacute labyrinthitis. One had black bone on the horizontal canal, which was chiseled off. The patient died in spite of later drainage of the porous internus. In these cases, clinical symptoms of meningitis were awaited on the theory that operation might cause the meningitis to spread. The author believes that in all these cases a one-stage operation should have been performed, as acute or subacute labyrinthitis was present at the time of operation.

Two cases showed postoperative labyrinthitis; the patients were operated on immediately following the finding of change in the spinal fluid; recovery followed.

In one case of postoperative labyrinthitis a Kernig sign was present on the third day, but the fluid did not show any change; operation was delayed for four days and death occurred.

Of five other patients, one had good hearing, but nystagmus to both sides. One day after operation there was an increase in the amount of globulin in the spinal fluid. Operation was performed on the labyrinth, and the patient recovered.

How many supposededly postoperative cases of meningitis were present before operation is unknown, as spinal puncture was avoided, as it was considered dangerous in cases of beginning meningitis. Altogether, there were eight cases of postoperative labyrinthitis. In six, secondary operation was performed on the labyrinth at the first sign of meningitis, and the patients recovered. In two, delay of one or two days was fatal.

Among the cases of acute labyrinthitis, three patients developed labyrinthitis and meningitis the first week after operation; in three others the disease occurred in from four to six weeks. Seven of eight cases were fatal. In one, spinal fluid punctures were made for four days, and at the first sign of meningitis operation was performed; the patient recovered. The author believes that cases of acute labyrinthitis with invasion of the labyrinth are unfavorable. No serous cases were observed.

Six of the forty-one cases were caused by minor operations on the middle ear. A polypus was removed in four cases, paracentesis was done in one and in one an attempt was made to close the eustachian tube.

In thirteen cases, free outflow of spinal fluid was noted at the porous internus; the patients recovered. In seven cases no outflow of liquor was noted at the porous internus; the patients died. This supports Uffenorde's experience.

INDICATIONS FOR THE LABYRINTH OPERATION AT THE ERLANGER CLINIC. W. BROCK, Ztschr. f. Hals-, Nasen- u. Ohrenh. **18**:196, 1927.

Eighty-six cases have occurred in the Erlanger Clinic since 1911, not including cases in which there were symptoms of uncomplicated fistula. Three were tuberculous and two were cases of necrosing panotitis following an attack of scarlet fever. In eight of the cases part of the function was retained.

The author believes that experience must teach the proper indications for operation. In twenty-four of the eighty-six cases the patients died, but in nine death occurred from causes other than those in labyrinthitis; therefore the mortality was 17.4 per cent.

In chronic suppurative otitis media, uncomplicated labyrinthitis per se is not an indication for operation on the labyrinth. If other indications for mastoidectomy are present, the labyrinth should be opened at once.

Nineteen cases were postoperative. Thirteen of the patients had a total loss of function; six, a partial loss. Of the thirteen, twelve were treated conservatively and recovered. One patient was operated on on account of high temperature and recovered.

In fistula cases, after acute suppurative otitis media, a primary operation is performed on the labyrinth. After chronic suppurative otitis media, operation on the mastoid only is performed if possible; but the condition must be watched carefully and if the pathologic process advances, operation should be performed on the labyrinth also.

INDICATIONS FOR LABYRINTHECTOMY WITH ESPECIAL REFERENCE TO THE ACUTE DIFFUSE DESTRUCTIVE TYPE OF LABYRINTHITIS. LUND, Ztschr. f. Hals-, Nasen- u. Ohrenh. **18**:204, 1927.

Briefly, the author's indications for labyrinthectomy are the presence of intracranial complications or the finding of pathologic changes in the labyrinth at the time of radical mastoidectomy. He considers pleocytosis as evidence of intracranial complication (meningitis), and his definition of this is three lymphocytes per cubic millimeter of spinal fluid. Neither the acute nor the chronic form is per se an indication for labyrinthectomy. Latent labyrinthitis seldom causes intracranial complications. These occur during the acute stage. Of fifty patients with latent labyrinthitis (functionless) on whom radical mastoidectomy was performed, only one died of meningitis; therefore the operation on the middle ear alone is not dangerous in this type of condition. The author believes that the danger of latent labyrinthitis is exaggerated. Circumscribed (fistula) and serous labyrinthitis are in the same class as chronic diffuse destructive labyrinthitis unless labyrinthectomy is performed. Of 159 cases in which fistula occurred, intracranial symptoms eventually developed in 37, with 12 deaths. Experience shows that as soon as a fistula becomes diffuse, the cerebrospinal fluid shows pleocytosis. In more than one half of the cases in which fistula occurred, the patients were infected with meningitis before symptoms of diffuse labyrinthitis appeared and before there was complete abolition of the function of the labyrinth. This was verified in nineteen cases, and probably occurred more often. Therefore, lumbar puncture is indicated in every case of serous and in every case of circumscribed labyrinthitis (fistula) with marked symptoms of the labyrinth with reduced function.

In the clinic with which the author is connected immediate lumbar puncture is performed on every patient with acute, diffuse, destructive labyrinthitis. If there are no clinical symptoms of meningeal irritation and if there are five or six cells in the Fuchs-Rosenthal counting chamber (equals 3 per cubic millimeter), or if clinical evidence of meningeal irritation develops, another puncture is done in twenty-four hours. If more than six cells appear, labyrinthectomy is performed immediately.

1. Not only in cases of acute diffuse destructive labyrinthitis, but in cases of marked serous or circumscribed labyrinthitis, is operation performed if the cell count increases or if the first count is fifteen or twenty cells per cubic millimeter.

2. Acute diffuse destructive labyrinthitis is indicated if the first count shows six cells in the counting chamber, namely, two per cubic millimeter.

3. If there are less than six in the first count, the second count is unnecessary unless clinical evidence of meningeal irritation develops, especially a rise in temperature. This warning comes in time for the surgeon to perform a labyrinthectomy successfully.

4. An immediately arising postoperative (including extraction of polypi) case of acute diffuse destructive labyrinthitis indicates immediate labyrinthectomy without awaiting the cell count on the spinal fluid. Increase is nearly always present.

The author quotes Neel, who, on the basis of 6,004 examinations, states that the normal cell count is from 0 to 1 per cubic millimeter. When operation was delayed until there was a cell count of more than 3, it was often too late. Since 1921, when 3 cells per cubic millimeter was established as an indication the operative procedure has never been resorted to too late. Examination of the spinal fluid in many cases is the best guide; it is better than functional examination, as meningitis may precede total loss of function. By careful observation of the patient, one or two punctures only are necessary if they are made at the right time.

The author is convinced that four fifths of all cases of acute diffuse destructive labyrinthitis in which there are intracranial complications are accompanied by pleocytosis from the beginning. If puncture at the onset of the destructive process shows the fluid to be normal, the case usually remains uncomplicated.

The author compares his mortality rate in forty-four cases (thirty-one labyrinthectomies) in which the patients were admitted before meningitis occurred, or 11 per cent, with Holmgran's statistics, twenty-nine cases who followed the indications of the Vienna school (all labyrinthectomized), or 31 per cent. Lund's total mortality in sixty-three cases was 27 per cent.

Labyrinthine meningitis in cases of acute suppurative otitis is most malignant and is usually present before total loss of function. In these cases a change of the spinal fluid is the earliest sign of meningitis. Acute exacerbation of chronic suppuration is almost as unfavorable. In both cases, infection takes place through a window. The meningitis is perhaps less foudroyant than in acute suppuration; so in these cases Lund's indications are practically the same as those of the Vienna school.

Cases of cholesteatoma have a relatively better prognosis. In nineteen cases complicated with meningitis thirteen patients were saved (out of a grand total of 130 cases).

Sudden cases of postoperative acute destructive labyrinthitis are nearly all complicated by meningitis, and immediate labyrinthectomy should be performed. Then the prognosis is better than in acute suppurative otitis media. Postoperative cases occurring from five to fifteen days or longer after operation without severe symptoms are not dangerous, and operation need not be performed.

CONTRIBUTION TO THE QUESTION OF TYMPANITIC OTITIS INTERNA. UNTERBERGER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **18**:223, 1927.

The author reports forty-three cases of which fourteen were circumscribed (fistula); three subacute; nine chronic and one tuberculous; this patient died of labyrinthine meningitis and cerebellar abscess. In these cases, in which the operation was carefully done under local anesthesia, except when subperiosteal abscess was present, operation on the labyrinth was performed in only two. Sometimes only the modified radical operation was performed.

Acute diffuse otitis media was manifest in twenty cases (total loss of function); acute suppurative otitis media was present in seven; operation on the labyrinth was performed in one, and death occurred in one.

There was one case of subacute otitis media; operation was performed on the labyrinth. There were eleven cases of chronic suppurative otitis media; operations were performed on the labyrinth in four cases; five of the total number of patients died.

In one case the patient was tuberculous; operation was performed on the labyrinth and the patient died.

Chronic diffuse latent labyrinthitis was present in nine cases.

In six cases of chronic suppurative otitis media operations on the labyrinth were not performed, and one patient died.

Three patients were tuberculous. No operations were performed and there were no deaths.

Indications for the various procedures are vague. There are no detailed case reports. One case of cerbellar abscess was overlooked on account of reliance on the results of the examination of the spinal fluid. The cell count was not stated.

Of interest is the author's recommendation of the roentgen-ray to promote healing. He uses from 30 to 40 per cent Holzknecht erythema doses from two to four times at intervals of from two to four weeks, and claims excellent results.

DISCUSSION OF PAPERS ON LABYRINTHITIS

Lange divided labyrinthitis practically into two classes: harmless and dangerous. The harmless cases are those in which the inflammation is limited to the labyrinth. The patients in these cases tend to spontaneous recovery. The dangerous cases are those complicated, especially by the threat of or presence of

meningitis. It is a mistake to classify the serous form as necessarily harmless and the suppurative as necessarily dangerous. In uncomplicated cases, labyrinthectomy is not required, but the operative observations may lead to the labyrinth. For the diagnosis of beginning meningitis the best guide is the changes in the spinal fluid; however, Lange makes some exceptions. Labyrinthitis in beginning acute suppurative otitis media is relatively harmless, even if there are slight changes in the spinal fluid. A simple antrotomy or radical operation for relief of disease of the internal ear is sufficient, and the meningitis which has just appeared recedes. In subacute or acute exacerbations in chronic cases, however, Lange advises labyrinthectomy as soon as meningeal symptoms are present. Postoperative or traumatic cases require immediate labyrinthectomy on the slightest evidence of meningeal involvement. He is more conservative, however, concerning recent cases than concerning those which develop late after trauma. Hearing is the best test of function. He operates only on labyrinths in cases in which the patients are practically totally deaf. He opens the cochlea, exenterates the modiolus and opens the vestibule. The canals are spared unless definitely diseased. He cautions the surgeon always to uncover the region of the saccus endolymphaticus for fear of overlooking an important focus. Lange has not lost a patient because of failure to operate when these indications were present.

Bruenings called attention to the disagreement concerning the number of cells in the spinal fluid which characterize meningitis. He has experimented with the cell count in different portions of the spinal fluid and has found that the number differs. It is greatest at the point of production. If drained dry, the last portion contains more cells than the first. After the Queckenstedt compression, there is still residual fluid; therefore the cell count is not a reliable sign. (His case reports in support of his theory are not convincing.)

Van Gilse says that in Holland the indications accepted are more conservative. They have less material, but in twenty years only two patients with postoperative cases with stormy onset have been labyrinthectomized in the Buerger clinic. The surgeons operate only if there is complete loss of function in definite diffuse suppurative cases. They believe that their method of using burr and rongeur is safer than chiseling.

Kobrak's method of caloric reaction is not reliable in severe infections of the labyrinth.

Uffenorde called attention to the absence of a consensus of opinion concerning the treatment of patients with labyrinthitis. He does not agree that total loss of function is per se an indication for labyrinthectomy. In the induced labyrinthitis of acute otitis, operation is performed only if indicated by the mastoid or retrotympanal symptoms. Only invasion of the meninges justifies operation on the labyrinth. It may be difficult to tell the exact moment at which this occurs, and there are no certain methods of examination of the spinal fluid; yet careful clinical observation will usually give the right time for intervention, and in general, the most certain sign is changes in the spinal fluid. Uffenorde has seen cure by operation in a case of acute otitis in which within thirty-six hours from onset a streptococcus labyrinthogenous meningitis was present. The differentiation of serous and purulent labyrinthitis may be impossible. In every case of labyrinthine meningitis, Uffenorde believes that the internal auditory canal should be opened. He agrees with Hinsberg that in uncomplicated cases it is unnecessary, but operation on the labyrinth is also unnecessary in such cases. He opens the internal auditory canal only at the fundus, and thereby obviates the objection that the Neumann procedure breaks up protective adhesions.

Neumann discussed only acute otitis. In labyrinthitis with complete loss of function occurring early (first day or so), immediate antrotomy is performed. In destructive labyrinthitis appearing later and also in mucosus otitis, he performs the combined radical and labyrinth operation in one stage. He also says that meningitis may occur before the spinal fluid shows any change. He has also observed meningitis which occurred two months after invasion of the labyrinth.

Voss agreed with Neumann and reported a case with complete loss of function and facial paralysis; after antrotomy, there was recovery with return of hearing. He also reported twenty-two cases of labyrinth irritation with spontaneous symptoms of the labyrinth and progressive loss of hearing, following an attack of influenza. Immediate antrotomy was performed with recovery and restoration of hearing. He also recommended operation on the labyrinth for basal fractures of the skull through the labyrinth.

Knick agreed with Lund that the spinal fluid is the best guide to the presence of meningitis. The changes there may precede the clinical symptoms days or weeks. If uncertain, cisternal puncture may be performed. Knick said that serous labyrinthitis is also dangerous, and advised that if the spinal fluid is normal, radical mastoidectomy should be done to relieve the labyrinth.

Scheibe agreed with Zange that one cannot know too much about pathology, but that clinical knowledge takes precedence. He reported cases, some examined histologically, in which loss of hearing did not occur for several days after the onset of suppurative labyrinthitis. He said that serous and suppurative labyrinthitis cannot be separated clinically. He is also opposed to operation on the labyrinth in the necrosing process of scarlet fever and tuberculosis. Scheibe has never operated on the labyrinth and has never lost a case. He called attention to the facts that early operation does not always prevent, and may bring on, meningitis.

Alexander classified the clinical forms of otitis interna as follows: (1) otitis interna serosa; (2) panotitis interna purulenta; (3) panotitis interna purulenta with or without fistula with certain presence of hearing and fully preserved labyrinth irritability, namely, with vertigo (in fistula cases with symptoms of the fistula); (4) panotitis interna purulenta with loss or diminished function of the labyrinth, no severe vertigo; symptoms of fistula not always present or only slight symptoms; (5) uncomplicated panotitis interna; (6) complicated panotitis interna, and (7) meningitic otitis interna purulenta diffusa.

Four methods of treatment are: (1) absolute rest, with the least possible local treatment; (2) immediate radical operation on the middle ear; (3) from six to eight weeks of absolute rest followed by radical operation on the middle ear; (4) immediate radical operation on the labyrinth.

1. In otitis interna serosa, the treatment should be conservative.

2. In panotitis interna purulenta with preserved function, immediate radical operation on the middle ear should be performed. This must be decided on promptly, otherwise dangerous complications may arise.

3. In panotitis interna purulenta with or without fistula with lessened or destroyed function of the labyrinth and in uncomplicated panotitis interna purulenta there should be six or eight weeks of conservative treatment followed by radical operation on the middle ear only.

(If operation on the middle ear is performed without waiting, a foudroyant meningitis develops. After waiting, the operation on the internal ear is unnecessary.)

4. In otitis interna purulent diffusa complicata, there should be immediate combined operation.

5. In early cases of meningitic otitis interna purulenta diffusa, not more than forty-eight hours after loss of hearing drainage of the internal ear should be performed by opening the external canal to preserve the hearing.

Alexander says that clinically there is no great difference between otitis interna following acute or chronic inflammation. Except in cases of hyperacute inflammation of the middle ear which leads rapidly to meningitis, the patients usually die regardless of immediate operation on the middle and internal ear.

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Larynx

DOUBLE VOCAL CORDS. WILHELM BERGER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:426 (Feb. 28) 1928.

A duplication of the vocal cords is a developmental disturbance, a so-called "sulcus glottideus (also 'sulcus vocalis') (Citelli)." Citelli could show this sulcus in 55 per cent of the larynxes he examined — comparatively more frequently in children than in adults. Citelli states that the sulcus glottideus is a regressive formation. It is found in the gorilla and other mammals; for instance, in the cat and pig. Citelli reported a case in which there was a real double formation of the vocal cords. Before Citelli, Salvi found that this sulcus is found mostly in human beings whose vocal cords' superior and inferior surfaces form an obtuse angle in a frontal cross-cut. It is claimed that this obtuse angle is found in the position of rest in anthropoids and the lower human races. It was found only ten times in the larynxes of fifty normal people, and but nine times in the larynxes of twelve people who had been executed. Citelli does not agree with Salvi concerning the importance of the obtuse angle. Alézias Oertel and Lautenschlaeger have reported cases of double vocal cords. The hoarse weak voice is explained by the incomplete closure of the glottis. Berger reports a case in point. A man, aged 23, a student of theology, had suffered from hoarseness since early youth. Before consulting Berger, he had been treated unsuccessfully for chronic laryngitis, psychogenic hoarseness and disturbance of mutation. Diphtheria and ulcerative processes could be excluded. The larynx was of medium size. The entrance and the posterior wall were reddened. The true vocal cords appeared slightly red and much swollen, with indistinct margins. The left was narrower than the right. On the surface of the right vocal cord, a blood vessel was noticed. A few millimeters under the true glottis a second glottis was observed. It was formed by two narrow, sharply defined, white cords which ran parallel with the true vocal cords. When the mucous membrane of the larynx was shrunk by cocaine epinephrine, the white cords were made plain in a width of from 2 to 3 mm. Examination of the voice showed the high pitch of the speaking voice to be "*d*," of the chest voice from "*B*" to "*e*," of the middle register from "*f*" to "*e'*" and of the falsetto voice from "*f'*" to "*c.*^{3}" In the chest register, an incomplete closure of the vocal cords was noticed. A spindle-shaped slit remained open. The same was true for the falsetto voice, but it was not so pronounced. Stroboscopy did not show any movement of the white cords under the vocal cords. Local treatment with menthol oil and ethyl-para-aminobenzoate, continued for several months, improved the chronic irritation of the larynx and pharynx. The inflammatory redness of the mucous membrane and the hypersecretion disappeared almost entirely. The vocal cords became paler, showed a more distinct outline and appeared narrower. Here the underlying duplications appeared to be of almost double width. The speaking voice was still too high, approximately from "*d*" to "*e*," but the various registers of the voice appeared somewhat lower: chest voice from "*F*" sharp to "*f*," middle register from "*g*" to "*d*" and falsetto voice from "*c'*" to "*g'* sharp" or "*a'*." The patient was told to take good care of his voice and to try to acquire a deeper register of speech. In this case, the existence of a bilateral prolapse of the ventriculi morgagni could be excluded by probing and by examination of the movements of the vocal process.

IRRADIATION OF TUBERCULOSIS OF THE LARYNX AND LUPUS OF THE MUCOUS MEMBRANE OF THE MOUTH WITH THE CARBON ARC LIGHT OF WESSELY. WILHELM SCHREYER, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:430 (Feb. 28) 1928.

In the clinic in Breslau, the prognostically unfavorable cases in which there is advanced disease of the lung, insufficient allergy, etc., predominate. In these cases, according to Wessely, irradiation does not promise any result. The author analyzes seventeen cases of tuberculosis of the larynx in patients who were treated

for some time by Wessely's method. In seven cases in which there were ulcerative processes and diffuse infiltration and ulceration, the condition of the larynx became worse. In three cases the condition remained stationary. In one case, in which there were larger ulcers on the vocal cords, the treatment cleansed the ulcers and made them smaller. Four patients with a more or less great area of infiltration on the posterior wall showed improvement and cure with scar formation. A patient with lupus of the larynx with a moderately large infiltration was not influenced, whereas a similar patient was cured. Contrary to these unsatisfactory experiences in tuberculosis of the larynx, the experiences with lupus of the oral mucous membrane have been favorable. The Wessely irradiation was used exclusively, except that general carbon light baths were employed in a few instances. Some patients with extensive lesions who had been treated for years by other methods without success were subjected to the Wessely method. In ten cases, complete cure was reported, and in four cases, pronounced improvement. The treatment was without effect only in a woman, aged 71, suffering from an ulcerative granulating alveolar lupus. The condition of this patient was improved by mesothorium. Of course, mesothorium, cauterization, caustic, diathermia, curetting, etc., formerly led to successes in many instances, but never so uniformly as did irradiation. Lupus of the nose and tuberculosis are little adapted to this method. In this instance, curettage and subsequent cauterization with lactic acid (Hinsberg) were found effective.

AMBERG, Detroit.

Nose

DECREASE OF PERSPIRATION AT THE TIP OF THE NOSE IN PEOPLE SUFFERING FROM OZENA (ANHIDROSIS-HYPHIDROSIS). O. MUCK, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:421 (Feb. 28) 1928.

The author had observed repeatedly that, on sultry days in summer, patients suffering from ozena did not perspire especially on the nose as normal people do. The author tried to cause twenty-five patients to perspire. If the light bath applied to the head with a temperature of 122 F. did not cause perspiration, 1 liter (33.8 ounces) of tea, made of blossoms of the linden tree, and 15 grains (1 Gm.) of acetylsalicylic acid, were given. Twenty-five controls were employed. Of the twenty-five patients with ozena, ten (40 per cent) did not perspire at the nose. The other fifteen perspired only on the face, the forehead, the eyebrows, the lower eyelids, the root of the nose, the upper lip and the chin. The tip of the nose, the border of the alae nasi and the membranous septum did not perspire. Minor, Jr., of Moscow paints the skin with a solution of iodine 15 cc., castor oil 100 cc. and alcohol to make 1000 cc. After the alcohol has evaporated, the yellow skin is firmly sponged with fine starch. The starch, which is prevented from sticking by the oil, is blown away. When perspiration sets in, little black spots appear on a snow-white ground. Many patients suffering from ozena perspire little on the face and not at all on the nose. If they perspire, anhidrosis or hyphidrosis of the tip of the nose, of the alae nasi and of the membranous septum can be seen. The nervus nasalis anterior passes through the anterior ethmoid foramen. It branches out in the anterior part of the nose (septum and outer wall). It sends an end-branch to the tip of the nose. Sometimes it passes through the foramen nasale and appears higher up on the nose. The lateral parts of the nose are provided for, not by the first branch of the trigeminus, but by the second branch. The sudorific fibers accompany the sweat nerves, as in the rest of the body. When the face becomes hot, a reflectory production of sweat can be caused only if the centripetal pathway of the fifth nerve and the centrifugal part of the reflex arc, which in its last portion joins the fibers of the trigeminus again, are intact. As the entire nose of healthy people perspires on adequate irritation by heat, the conclusion is plausible that an organic lesion of the nervus ethmoidalis anterior, or of the accompanying sweat fibers, must take place

within the nose. Patients suffering from chronic suppuration of the nasal accessory cavities react to artificial perspiration like people without nose trouble. It must be assumed that in ozena a severe injury in the region of the sympathetic nerve is present. The pathologic secretion of mucus and of the glands, which presents itself in crust formation, favors this point of view. There is no ozena of the nasal accessory cavities. The mucous membrane of the maxillary sinus is provided for by the second branch of the trigeminus nerve (nervus alveolaris). The author states that his investigations support the idea of Zarniko (1905) that ozena is of endogenous origin. In a postscript, Muck states that he observed anhidrosis in an early stage of ozena.

AMBERG, Detroit.

Miscellaneous

AUXILIARY APPARATUS FOR THE CHEST SUPPORT AUTOSCOPE FOR DIRECT EXAMINATION. A. SEIFFERT, Ztschr. f. Hals-, Nasen- u. Ohrenh. **19**:461 (Feb. 28) 1928.

Objection has been made to the chest support autoscope, because it is assumed that too strong a pressure is exercised on the incisors. The apparatus functioned well with intact incisors. If the upper incisors are diseased, or, if they are crowned, the pressure should be exercised on all teeth, and perhaps also on the palate. A dental prothesis, pliable in hot water, may be used. A slit can be made for the incisors, so that they do not come into play at all. Seiffert has used such a dental plate for years with satisfaction. Its use is advantageous in patients without teeth.

AMBERG, Detroit.

Society Transactions

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

Regular Meeting, Jan. 9, 1928

GEORGE F. FISKE, M.D., *President, in the Chair*

DRAINAGE OF CISTERNA PONTIS LATERALIS IN MENINGITIS (CASE II). DR. ALFRED LEWY.

A month ago, I presented a case of purulent meningitis with recovery. In this case, the outcome was not so fortunate. The patient was a woman, aged 29. Both ears had discharged since childhood. In October, 1927, she complained of vertigo, ataxia and vomiting. A mastoid operation was performed, followed by relief of symptoms. Six weeks before I saw her, she had left facial paralysis. She then spent ten days in another city where she was delirious and under the influence of morphine. When I saw her, wild delirium, stiff neck, positive Kernig sign, fever, purulent discharge from the left ear, a mastoid scar with two fistulas, left facial paralysis and total deafness in the left ear were present; she could hear conversation at a distance of 3 feet with the right ear. The spinal fluid was turbid and under pressure.

A radical mastoid operation was done; the dura, the middle and posterior fossae, lateral sinus, and Trautman's triangle were uncovered and the dura dissected up from the posterior surface of the petrosa to the cisterna pontis lateralis, which was opened; on the way, a small accumulation of pus was encountered, and a xeroform gauze drain was inserted. The patient was quieter and did not require morphine, but she died on the fourth day after operation.

SPECIFIC LABYRINTHITIS. DR. AUSTIN A. HAYDEN.

Dr. Hayden reported the case of an Italian woman, aged 34, who was first seen on Dec. 1, 1927, when she complained of severe headache, vomiting and discharge from the left ear. The vomiting and headache had been pronounced for four days. She was admitted to St. Joseph's Hospital, and an extensive mastoid operation was performed. There was a history of recurrent suppuration in the left ear for the past nine years. She had two living children and had had three miscarriages. Her husband admitted having syphilis and taking treatment for it for eleven years. He said that repeated blood and spinal fluid Wassermann tests made on the patient were negative. The husband's acuity of vision consisted of an ability to count fingers at about 6 feet; his pupils were stationary, and the optic disks almost snow white.

The patient's vision apparently was normal; the disks were normal, the pupillary reactions prompt, and the intra-ocular symptoms were negative. The mastoid operation revealed an acute exacerbation of an old, suppurative process that had dissected out most of the mastoid cavity and cells. The destruction extended almost to the facial nerve, and under pressure in the atticus caused facial twitching. Examination of the spinal fluid showed a ++++ Wassermann reaction, 44 cells and a sterile fluid. Antisyphilic therapy was immediately instituted.

When the patient was first seen there was a marked rotary nystagmus to the right in the horizontal position and a marked horizontal nystagmus with the head in the vertical position. About twelve days after the operation facial paralysis was noticed, which apparently became more marked. It was thought that this might be due to pressure from the dressings or from the filling in of the granulation tissue.

The patient was discharged from the hospital on Jan. 8, 1928, with the wound in good condition.

DISCUSSION

DR. JOSEPH C. BECK: In regard to the facial paralysis, it must not be forgotten in cases of this type that a swelling of the nerve from antisyphilitic treatment might produce the paralysis, but if the treatment was followed up, the condition would probably improve.

Were hearing and caloric tests carried out?

DR. HAYDEN: In the affected ear a whisper could be heard at a distance of 8 feet, which I consider good under the conditions that were present. Caloric tests were not made, because the patient was extremely nervous. The falling reaction was entirely to the left side when I saw her in her home the first time.

DR. GEORGE W. BOOT: Dr. Hayden has failed to prove that this was a case of syphilitic labyrinthitis, as a syphilitic patient could have any type of labyrinthitis just like any other patient.

DR. HAYDEN: I agree that it might be better to describe the case as mastoiditis occurring in a syphilitic patient, with a disturbance of the semicircular canal. Under the antisyphilitic therapy, she was making marked improvement.

ABNORMALITY OF VOICE. DANIEL HAYDEN.

Dr. Hayden presented a patient whose voice had been normal up to the age of 14, who had been sent to him for observation because of marked bowing of one vocal cord and slight bowing of the other. The boy was turned over to Dr. Kenyon to determine whether or not the condition was functional.

DISCUSSION

DR. ELMER L. KENYON: I did not obtain a sufficiently clear view of the larynx. What I saw that was unusual was a groove parallel with the border of the right cord, and a marked bowing of the cords in the anterior part of the larynx. The question for decision is whether the condition seen in the vocal cords is primary or, on the other hand, secondary to a primary functional disturbance. The voice is high-pitched and strained, and the thyroid cartilage moves upward with tension precisely as it does in the falsetto voice of puberty. Such a malaction of the extrinsic muscular system results in a bowing of the cords similar to that exhibited by the patient.

It is interesting to note that the trouble came on at the time of puberty, and when the boy was living an unusual life in a soldier's camp. If one bears in mind that at such times trouble with the function of talking frequently occurs and from similar conditions of nervous stress, there is a good basis for reasoning that the trouble is primarily functional, but I shall study the case further.

DIPHTHERIA OF THE MIDDLE EAR. DR. GEORGE J. MUSGRAVE.

Dr. Musgrave presented a man, aged 24, who consulted him during the past summer because of a chronic, foul smelling discharge from the ear. The hearing was practically normal. The eardrum presented some thickening and complete detachment of Shrapnell's membrane. With a cotton applicator the débris was cleaned out, and this had to be repeated every six weeks. A roentgenogram showed slight change in the mastoid process. Microscopically, the discharge resembled that given by accumulated leukocytes, but was yellow. Culture showed the Klebs-Loeffler bacillus.

DENTIGEROUS CYST. DR. GEORGE J. MUSGRAVE.

Dr. Musgrave also presented a patient with a dentigerous cyst. He gave the usual history of a maxillary sinusitis, but when the sinus was gone through, the cyst was found to be a separate compartment, not communicating with the nose.

MANAGEMENT OF MALIGNANT DISEASE IN OTOLARYNGOLOGY. DR. JOSEPH C. BECK.

Dr. Beck reviewed his experience with malignant conditions about the head and neck over a period of twenty-five years. He believed that the discouraging outlook of the past has been replaced by a more hopeful attitude, due mainly to a newer approach in the attack on malignant disease. Radical operation combined with "en block" dissections of the associated glands in conjunction with surgical diathermy, roentgen ray and radium has changed the outlook and given more hope in combating this problem. Extensive radical operation was stressed as far as possible by means of surgical diathermy. The objection to the use of surgical diathermy, namely, postoperative hemorrhage, can be obviated by prophylactic ligation of the external carotid or, if found necessary, by a slow compression ligation of the common carotid. In the "en block" dissection of the glands, the jugular is frequently sacrificed and occasionally even the common carotid. The efficacy of laryngectomy for laryngeal carcinoma was stressed. The technic of surgical diathermy and the use of synergistic analgesia were described, as were some of the never prostheses for remedying the postoperative deformity. The "open" treatment of the wound with radiotherapy and the careful check on the granulations by biopsy were also discussed. Emphasis was placed on prevention of pain in hopeless cases by injections of the trigeminal nerve or resection of the gasserian ganglion.

DISCUSSION

DR. G. W. BOOT: I congratulate Dr. Beck on his results, and I agree that diathermy in cases in which it is suitable is perhaps the best means for treating persons with carcinoma of the throat, nose or head, but even this is not uniformly successful.

Regarding the five year period of nonrecurrence as indicating a cure of cancer, I doubt whether cancer can ever be considered as certainly cured. It is not the simple condition that some seem to think, or the cause of cancer would have been discovered long ago. I do not think that cancer is hereditary, or it would appear at a definite time of life just as other things do that are hereditary; instead, it has appeared at all ages from infancy to extreme old age. I do not believe that cancer is born in the cell, in the ovum or in the chromosomes. It is not a cell rest, nor is it the result of irritation purely. If it were, most men should have cancer of the face, for who does not continually irritate his face while shaving? I have on record two cases in which cancer followed one single act of trauma. One man accidentally cut his lip with a cleaver, and cancer followed. Another was struck on the cheek by a flying chip of wood, and cancer developed on the little wound. Cancer can be produced in rabbits and in mice by painting their skin with coal tar. Some slow chemical or biochemical change takes place in their bodies and particularly in the structures which develop from epiblast, which prepares the way for cancer; then comes the irritant, which is often a chronic irritation but which may be a single act of irritation, and a cancer develops. Thus it is that the smoker's pipe causes cancer to develop on his lip. If a clean and complete operation is done for cancer of the breast, the patient may not see any sign of return for five years, but later the disease may return because the system has already been prepared and only awaits a suitable irritation for the cancer to reappear. This is probably why so many cancers of the breast recur either locally or at some distant point. It is not reasonable to suppose that a metastasis occurred at the time of operation or before and remained dormant for five years. Local recurrence may be due simply to the irritation of scar tissue in a previously sensitized patient.

I have hardly ever seen a cancer of the mouth or throat in a patient who kept his mouth clean. As a rule, such patients have filthy mouths. They appear never to have used a tooth-brush. It may be possible that the toxins

from these filthy mouths may be the sensitizing agent. Whatever it is, it is a slow process which in the average patient extends over many years. In the mouse, the tar must act for about two months before cancer occurs. In the rabbit, it takes several months.

Wallin of the University of Colorado and Buchner of Greifswald have recently done considerable work on symbionticism. They found that in many forms of animal life bacteria live within the cells of the animal during its whole life without doing harm; in fact, that the animal really seems to be a combination of animal cells and bacteria. It seems to me that further knowledge along this line may explain the development of cancer.

Dr. Michael Goldenburg: Dr. Boot's statements are worthy of consideration, but on that hypothesis how can he account for malignant disease in persons 1 year of age, particularly the intra-ocular malignant diseases. On his return from Tibet where he spent two years, McCarrison stated that he did not see a single instance of malignant disease but that as he again approached civilization such diseases appeared.

I am inclined to think that Dr. Boot was correct in his assumption that a person with malignant disease is never cured. If a malignant condition could be recognized when the first cell divides one might be able to accomplish something, but after division takes place the new cells do not always remain at the point of origin, but may locate anywhere. It is probably true that the nature and character of the new cell, the environment and tissues in which it was born, play an important part in its growth and ability to spread to other parts. McCarrison's observations are interesting in that they tend to add weight to the theory based on a defective metabolic chemistry.

Dr. Boot: The explanation for the early cases of malignant disease is probably based on the fact that some persons are more likely to develop cancer than others. Cancer is not born in one, but some persons have a predisposition to the disease. Malignant conditions occurring in persons under 1 year of age are principally sarcomas, which develop from a different type of cell, although cases of both carcinoma and sarcoma are on record, and one type of growth changes into the other in some instances.

Dr. Beck: The Society for the Control of Cancer believes that five years of life following operation constitutes cure. A patient may live for five years and die of an intercurrent disease. Cancer has never been known to develop in a blood vessel or in cartilage, probably because there is no epithelial structure there. A Polish observer, Adamkovitch, has made a serum from cartilage and arterial walls and uses this for injection, just as Fichara, several years ago, took liver and embryonal tissue mixed with cancer tissue and injected it into patients with cancer, with marked results in stopping the growth.

I feel that irritation has a great deal to do with the development of cancer. Experiments with animals have little bearing on cancer in man, but irritation in animals can produce epithelial growths. Chimney-sweeps develop cancer frequently, and many other things prove the irritation theory, irritation produced either by bacteria or by something else. Dr. Emil Beck has recently shown cases of from ten to fourteen years' duration, and he felt sure that relief can be obtained for comparatively long periods, if not cure.

Dr. Boot: I repeat my assertion that irritation alone will not produce cancer, but that it acts in combination with some other element.

Dr. George F. Fiske: Why has Dr. Boot been able to produce cancer in white mice and not in white rats? If this exemption exists in animals, why could it not occur in human being as well?

Dr. Boot: I believe that I did not keep up the work with the white rats long enough to obtain this result, but that I could have produced cancer if I had continued the experiments longer.

COLLEGE OF PHYSICIANS OF PHILADELPHIA, SECTION ON OTOLOGY AND LARYNGOLOGY

Regular Meeting, Feb. 15, 1928

JAMES A. BABBITT, M.D., *in the Chair*

THE NEUROLOGIC ASPECTS OF INFECTIONS OF THE NASAL SINUSES. DR. SIMON L. RUSKIN (by invitation).

Many manifestations of disease of the sinuses usually attributed to absorbable toxins are not necessarily due to this but can be traced to irritation of the nerves from an inflamed mucous membrane. The effects need not be on adjacent structures, but remote effects may be produced through pathways which at first glance appear to be impossible, yet which may be traced by a fairly direct route. The paper of Dr. Ruskin dealt with the latter condition.

Neurogenic disturbances arising from infections of the sinuses were classified as follows: (1) acute pains in inflammation of the sinuses, (2) chronic neuralgia, (3) vasomotor and secretory states and (4) systemic effects induced chiefly through the vegetative nervous system.

The nerve tracts concerned are the trifacial, the facial and the vegetative system. The symptoms arising from the seventh and vegetative nerve systems were especially emphasized. In lower animals, the olfactory nerve probably does not play a more important part than the three nerve tracts already mentioned. The animal reacts to environmental changes reflexly with its eyes and ears, its sympathetic and endocrine systems. Disease processes, too, can stimulate these structures.

In the nose is located the only superficially placed sympathetic nerve center, the sphenopalatine ganglion. Acute purulent conditions of the sinuses cause few neurologic disturbances, but in the chronic cases in which the roentgen ray shows slight thickening of the lining membrane, such symptoms are more apt to be present.

A case of ophthalmic migraine occurring in a man, aged 41 years, was cited in which the patient was entirely relieved after eight cocainizations of the sphenopalatine ganglion. Several other cases of a similar nature were described.

Dr. Ruskin believes that tic douloureux is the result of simultaneous involvement of the fifth and seventh nerves, and that the nasal ganglion, which receives fibers from both, acts as the trigger of the attack. He feels that excellent results can be gained from treatment of the nasal ganglion.

Blocking of the nasal ganglion will relieve many patients with asthenopia. Here the pains are due to overaction of the facial muscles resulting from irritation of the facial nerve via the nasal ganglion. According to Hunt, the nervus intermedius of Wrisberg is the sensory portion of the facial nerve. From the geniculate ganglion, the ganglion of the sensory facial, the greater superficial petrosal nerve travels to the nasal ganglion. This connection is of great importance. This nerve contains taste fibers to the roof of the mouth and side of the tongue, tear fibers to the lacrimal gland, motor fibers to the levator palati muscle and sensory fibers as well. The pains described as part of the Sluder syndrome referable to the back half of the head closely follow the facial distribution rather than the trigeminal. Some patients show a decided "front-half" headache; others have pains in the "back-half" of the head. This Dr. Ruskin believes to be due to two different mechanisms, one trigeminal, the other facial. In the "front-half" type, the pains are typically sensory; in the "back-half," they are myalgic. These pains are readily relieved by blockage of the sphenopalatine ganglion.

The myalgic nodes and painful muscles at the back of the head are vasomotor in origin. Mueller has shown that the nerve of Wrisberg carries

cranial autonomic fibers, some of which pass to the nasal ganglion. Dr. Ruskin believes that these fibers also pass along the facial branches to the muscles and that irritation of the cranial autonomics in the nose cause vasomotor spasms in the facial distribution. This spasm interferes with muscle metabolism and gives rise to local symptoms. The same mechanism can be used to explain the almost uncanny results obtained in persons with severe pain in the shoulder, lumbago and sciatica.

Probably some cases of noises in the ears and impaired hearing are due to vasomotor disturbances in the ear and myalgic conditions of the stapedius muscle.

Dr. Ruskin feels that the pathologic conditions of the nose play an important part in determining the direction of the equilibrium of the vegetative nervous system, i. e., the balancing of anabolic and catabolic changes. Frequently the pain and nausea of dysmenorrhea can be relieved by treatment of the nasal ganglion. Spastic states of the gastro-intestional tract sometimes can be corrected by similar therapy. The pathway here is most likely through the vagus, which is depressed through the nasal ganglion. One case of persistent asthma secondary to infection of the maxillary sinuses yielded to treatments of the nasal ganglion.

Dr. Ruskin considers the catabolic type to have chiefly visceral and spastic manifestations, while the anabolic group show muscular, vasomotor and secretory phenomena. Both types represent the systemic effects of irritation of the nasal nerves.

Vasomotor states of the local nasal structures resulting in sneezing and rhinorrhea can be controlled by cocainization of the nasal ganglion.

DISCUSSION

Dr. T. H. Weisenberg: If the patient complains of pains in the arms, pains in the legs, dysmenorrhea, intestinal trouble, headache, asthma or most any other disorder, one should take a chance—treat the nasal ganglion and probably there will be relief from the complaint. In order to be appreciated as such, all pain sensation must reach the cerebrum, and all parts of the body are supplied with pain fibers. If the pain fibers from various parts of the body passed through the nasal ganglion, then blockage of this ganglion would stop the pain. However, pain fibers from the leg pass through the cord and do not touch the ganglion in question.

The work of Dr. Hunt on the sensory fibers of the seventh nerve has been questioned. It is surprising that the ninth nerve, which beyond doubt carries fibers of sensation, was not mentioned in the paper. The involuntary nervous system would be a better name for the vegetative system. It has afferent and efferent paths like those of the spinal nerves, and differs from them in that the motor portion has its own separate ganglion. Visceral sensation passes through the posterior roots to reach the cord, the same as sensation from other portions of the body. I have carried out tests to determine how much hyperesthesia is normally present. Forty years ago, Head outlined various zones of hyperesthesia that occurred in disease of the teeth, tonsils, sinuses, etc. In appendicitis, the zone of increased sensation is supplied by nerves from the ninth, tenth and eleventh thoracic segments. By no anatomic trick can pain of this sort pass through the nasal ganglion. The work of Dr. Sluder is interesting, but it is questionable if the so-called Sluder syndrome is really an entity. At any rate, the results obtained by Dr. Ruskin in this type of case have not been secured here in Philadelphia.

Dr. Charles Frazier, acting at the suggestion of Dr. William G. Spiller, has perfected an operation for the relief of the pain of tic douloureux. This operation avulses the sensory root of the fifth nerve, leaving intact the fibers of eye sensation and the motor portion. In a series of hundreds of cases fatalities have not occurred, so that the operation need not be feared.

True cases of sciatica are rare. Most so-called cases are due to muscular pains secondary to disorders of the pelvic joints. The terms anabolic and catabolic carry the same message to the neurologist as vagatonia. True mental derangement does not result from infected teeth, tonsils, etc. Toxic effects may occur, but not true mental derangement.

DR. ROSS H. SKILLERN: Headaches in disease of the sinuses may be the result of irritation of the nerve endings, pressure, negative pressure and toxic absorption.

These always overlap and are never distinct. They usually come on after one arises in the morning, last several hours, then disappear. This may be due to the evacuation of pus followed by adequate aeration and drainage.

Mental states may occur during the period of congestion of the sinuses. This sometimes is a feeling of apprehension which is followed by depression, even melancholia. The causes of these mental conditions are either congestion of the meninges or absorption of toxins. As soon as ventilation and drainage are established, the symptoms disappear.

DR. R. H. THOMPSON: The nasal or phenopalatine ganglion is one of four peripheral vegetative ganglions lying in close topographic relation with the fifth cranial nerve. The others are the ciliary, the otic and the submaxillary ganglions. All four are joined by connector fibers with the superior cervical sympathetic ganglion which in turn has to do with the thoracicolumbar or true sympathetic outflow from the spinal cord. In addition, each ganglion receives preganglionic fibers from a cranial nerve, analogous to the white rami communicantes from the spinal cord to the vertebral sympathetic ganglions: The ciliary from the third nerve, the nasal from the seventh, the otic from the ninth and the submaxillary, again, from the seventh.

Neuro-anatomists seem agreed that the centers for vegetative reflexes lie within the central nervous system and not within peripherally located ganglions. An afferent pathway, a connector and an efferent pathway are necessary for the reflex activity just as they are for a reflex of the voluntary nervous system.

For reflexes with which these four ganglions are concerned, the afferent pathway would lie within the cranial visceral afferent system, i. e., the seventh, ninth and tenth nerves. All such fibers enter the tractus solitarius and end in the nucleus of that tract in the medulla.

From the afferent or sensory center, connector fibers are given off to be distributed to the visceral motor nuclei, including the nucleus ambiguus and the dorsal motor nucleus of the vagus. In this way, arcs are established for a large and important group of reflexes.

The effector or motor fibers concerned travel along the cranial nerves already mentioned to end in the four terminal vegetative ganglions. From these, new axons are given off to be distributed to the various structures of the head.

That the nasal ganglion, or any other peripheral ganglion, should be of such importance in the symptomatology and treatment of patients for obscure neurologic conditions, and that it should be an avenue of approach to the vegetative system throughout its vast and complicated mechanism, seems to me to be beyond an anatomic explanation.

DR. RUSKIN: I agree that a possible pain pathway through the sphenopalatine ganglion does not exist, but the cranial autonomics may be important in vasomotor control. Then, too, the stimulation of the autonomic system gives a response out of proportion to the stimulus applied. When headaches are of vasomotor origin they can be controlled by applications of cocaine to the sphenopalatine ganglion.

Book Reviews

ASTHMA; ITS DIAGNOSIS AND TREATMENT. By WILLIAM S. THOMAS, M.D. Price, $7.50. Pp. 279 with 26 illustrations in black and white and 6 in colors. New York: Paul B. Hoeber, 1928.

This book is the first treatise devoted exclusively to the diagnosis and treatment of asthma that has been written by an American author. The author gives the method for studying a patient suffering from this symptom and goes into detail, particularly regarding the general examination and the search for the sensitizing substances including the details regarding the skin tests. The chapters on general treatment and the methods of desensitizing patients are clearly written and will serve as an excellent guide for physicians who desire to go into this field of work.

Reference is repeatedly made to rhinologic symptoms which are so conspicuous in many cases of asthma, and the author points out that infection in the paranasal sinuses is a frequent complication in the intractable cases. The author fails to bring out the conspicuous rôle which the hyperplastic form of ethmoiditis often plays in the etiology of asthma, and the book is conspicuous for its failure to present some evaluation on the contributions made by the rhinologist in the study of this disease. As a matter of fact, the symptoms of hyperesthetic rhinitis—sneezing attacks, profuse watery discharge from the nose, intermittent nasal blocking—so characteristic of incipient hyperplastic ethmoiditis, the eventual appearance of nasal polypi, and the development of persistent asthma, then the frequent relief of all these symptoms including the attacks of asthma through the removal of the nasal polypi and eventual exenteration of the ethmoid is such a frequent clinical phenomenon that a book on the diagnosis and treatment of asthma which omits entirely a presentation of this aspect is conspicuous because of this omission.

Asthma is one of the best illustrations of a condition the proper study of which necessitates cooperation between the internist and the specialist in rhinology. This book by Thomas will be welcomed by the internist as presenting the conclusions which have been reached by the study of asthma from the standpoint of the internist. For the same reason, it is a book which every rhinologist should study. The work is well illustrated.

Directory of Ophthalmological and Otolaryngological Societies

INTERNATIONAL

FIRST INTERNATIONAL OTO-RHINO-LARYNGOLOGICAL CONGRESS

President: Prof. E. Schmieglow, University of Copenhagen.
Place: Copenhagen, Denmark. Time: July 29-Aug. 1, 1928.

NATIONAL

AMERICAN MEDICAL ASSOCIATION, SECTION ON LARYNGOLOGY, OTOLOGY AND RHINOLOGY

Chairman: Frank R. Spencer, 1345 Spruce St., Boulder, Colo.
Secretary: William V. Mullin, Cleveland Clinic, Cleveland.
Place: Minneapolis. Time: June 11-15, 1928.

AMERICAN BRONCHOSCOPIC SOCIETY

President: Dr. Sidney Yankauer, 780 Park Ave., New York.
Secretary-Treasurer: Dr. Louis H. Clerf, 128 S. 10th St., Philadelphia.

AMERICAN LARYNGOLOGICAL ASSOCIATION

President: Dr. Bryson Delavan, 40 E. 41st St., New York.
Secretary: Dr. George M. Coates, 1721 Pine St., Philadelphia.
Place: Hotel Raleigh, Washington, D. C. Time: May 1-3, 1928.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY

President: Dr. John F. Barnhill, 241 N. Pennsylvania St., Indianapolis.
Secretary: Dr. R. L. Loughran, 33 E. 63d St., New York.
Place: Raleigh Hotel, Washington, D. C. Time: May 3-5, 1928.

AMERICAN OTOLOGICAL SOCIETY

President: Dr. Max A. Goldstein, 3858 Westminster Pl., St. Louis.
Secretary: Dr. Thomas J. Harris, 104 E. 40th St., New York.
Place: Raleigh Hotel, Washington, D. C. Time: April 30-May 1, 1928.

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LOCAL

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